EFFECTS OF A COMPLEX COGNITIVE STRATEGY ON LOCUS OF CONTROL FOR STUDENTS WITH LEARNING DISABILITIES

By

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Understanding the motivational patterns of students with learning disabilities has become the focus of considerable research. Despite consensus on the importance of motivation in the achievement of students with learning disabilities, determining the exact role of motivation in achievement continues to challenge researchers.

The need to increase the motivation of students with learning disabilities has led researchers to study specific affective variables such as locus of control. Researchers have studied the relationship of locus of control to academic achievement and have determined that measures of internal locus of control and academic achievement are related positively. Students with learning disabilities tend to have a more external locus of control than students without learning disabilities, which further disadvantages them in

the school setting. An external locus of control is expressed in the belief that one cannot influence outcomes, such as performance on tests. In view of the recent efforts to understand the links between an external locus of control and poor performance on school-related tasks, further investigation of locus of control among students with learning disabilities was warranted.

The present study investigated the effects of a complex cognitive test-taking strategy system on the locus of control orientation of 40 middle school students with learning disabilities. A randomized pretest-posttest control group design was employed in the present study. A repeated measures analysis of variances (ANOVA) was used to accept or reject the null hypothesis of no change in locus of control.

No significant differences between the experimental and comparison groups were found on two measures of locus of control: the Nowicki-Strickland Locus of Control Scale and the Individual Achievement Responsibility Questionnaire. However, correlation coefficients for the experimental group indicated a strong positive relationship between Verbal IQ scores and the Nowicki-Strickland Locus of Control Scale posttest scores and a moderate positive relationship between the full scale IQ scores and the Nowicki-Strickland Locus of Control Scale posttest scores. Finally, ratings of students in the experimental group and their special education teachers indicated satisfaction with the complex cognitive test-taking strategy system.

CHAPTER 1
INTRODUCTION TO THE PROBLEM

Introduction

The academic and affective development of students with learning disabilities has become a growing concern for educators, parents, and counselors (Bender, 1987; Deshler & Schumaker, 1986; Omizo & Omizo, 1987). General agreement exists regarding the relationship between motivation and classroom learning. Understanding the motivational patterns of students with learning disabilities is becoming the focus of considerable research (Bendell, Tollefson, & Fine, 1980; Borkowski, Weyhing, & Carr, 1988; Chapman, 1988; Short & Weissberg-Benchell, 1989).

Successful students typically approach new learning tasks with positive motivational attitudes, whereas failure-prone students frequently approach learning tasks with negative attitudes (Licht, Kistner, Ozkaragoz, Shapiro, & Clausen, 1985). Typically, students with learning disabilities experience some degree of frustration in approaching and completing academic tasks. It has been hypothesized that prolonged academic failure adversely affects students' perceptions of their abilities (Snyder, 1982) which ultimately contributes to a decline in motivation to achieve (Bryan & Pearl, 1979; Lewis & Lawrence-Patterson, 1989; Rogers & Saklofske, 1985). Despite consensus on the

importance of motivation in the achievement of students with learning disabilities, determining the exact role of motivation in achievement continues to challenge researchers (Short & Weissberg-Benchell, 1989).

The need to increase the motivation of students with learning disabilities has led researchers to study specific affective variables such as locus of control. Locus of control, a theoretical construct derived from social learning theory (Rotter, 1966), refers to the degree to which individuals expect that consequences are contingent upon their behavior (Rotter, 1990). Specifically, when individuals believe that outcomes are contingent upon their behavior, they have an internal locus of control. In contrast, when individuals believe that outcomes are contingent upon luck, fate, or powerful others, they have an external locus of control. Thus, some individuals perceive themselves to be in control of the events or outcomes in their lives, while other individuals perceive these outcomes as being controlled by forces beyond their control.

Lewis and Lawrence-Patterson (1989) have noted that many researchers have studied the relationship of locus of control to academic achievement and have determined that measures of internal locus of control and academic achievement are related positively. Furthermore, Nowicki and Strickland (1973) reported that school achievement correlates more highly with measures of locus of control than with measures of intelligence. Thus, compared to individuals with an

external locus of control, it appears that individuals with an internal locus of control, regardless of ability, are more likely to succeed in their efforts.

A number of researchers (Aponik & Dembo, 1983; Chapman & Boersma, 1979; Fincham & Barling, 1978; Gardner, Warren, & Gardner, 1977; Hallahan, Gajar, Cohen, & Tarver, 1978; Licht, Kistner, Ozkaragoz, Shapiro, & Clausen, 1985; Rogers & Saklofske, 1985; Snyder, 1982) found that on measures of locus of control, students with learning disabilities are more likely to attribute success or failure to external factors than students without learning disabilities. For example, Hallahan et al. (1978) compared 28 junior high students with learning disabilities with a sample of students without learning disabilities. Subjects were matched on school, sex, race, chronological age, grade level, and, as closely as possible, on mental age. Both a general measure of locus of control, the Nowicki-Strickland Locus of Control Scale (Nowicki & Strickland, 1973), and a specific measure of (academic) locus of control, the Intellectual Achievement Responsibility Questionnaire (Crandall, Katovsky, & Crandall, 1965) were used. Both measures of locus of control differentiated the group with learning disabilities from the matched group without learning disabilities.

Contradictory findings also have been reported (Cooley & Ayres, 1988; Hiasma, 1976; Tollefson, Tracy, Johnson, Buenning, Farmer, & Barke, 1982). For example, Tollefson et al. (1982) administered the Intellectual Achievement

Responsibility Questionnaire to compare 35 students with learning disabilities to 99 students without learning disabilities, selected by the school principal. The researchers found no significant differences between the two groups on the locus of control measure. One possible explanation for this anomaly is that no matching procedure was used to select the group without learning disabilities.

Findings that document group differences in students' locus of control orientation have implications for teachers who work with students with learning disabilities. Understanding the locus of control orientation of students with learning disabilities may prove useful in identifying effective interventions for these students. Appropriate educational interventions must include shifting the student's external locus of control to a more internal orientation. Clearly, more research on the locus of control orientation of students with disabilities is warranted.

At the 30th Annual Learning Disabilities Association of America International Conference in 1993, members voiced a growing concern for students with learning disabilities who are not achieving success in school. Finding ways to augment motivation and improve school performance for students with learning disabilities continues to be the central theme at professional conferences and in the special education literature.

Lack of motivation and persistence in the school setting has emerged repeatedly in the literature as a common

characteristics of students with learning disabilities (Mercer, 1992). However, motivation and effort are not the only variables related to overcoming the academic difficulties of students with learning disabilities. Experts in the field of learning disabilities (Borkowski, Weyhing, & Carr, 1988; Deshler & Schumaker, 1986; Torgesen, 1988) note that students with learning disabilities often lack knowledge of cognitive strategies that are necessary to achieve academic success. Explicit instruction in cognitive strategies that are congruent with the development of an internal locus of control orientation is needed.

Borkowski, Estrada, Milstead, and Hale (1989) postulated that task persistence and expectancy of success are attributes of students who see a connection between using strategic behavior and succeeding at a task. According to Borkowski, Weyhing, and Turner (1986), motivation and effort are essential components in self-regulated learning or metacognition. Metacognition, the ability to make choices among different strategies, to judge the applicability of strategies to specific tasks, to change strategies, and to invent strategies to meet task demands, is a valuable (but usually underdeveloped) skill (or set of skills) for students with learning disabilities (Brown, 1988). Brown (1988) noted that motivation tends to increase the likelihood that students will engage in spontaneous and successful metacognitive strategies. According to Paris and Oka (1986), students with learning disabilities need to be convinced that

the time spent in learning how and when to use strategies is a worthwhile endeavor. According to Ellis, Deshler, and Schumaker (1989), providing rationales for learning (metacognitive) strategies is the cornerstone of successful metacognitive intervention for students with learning disabilities. Questions involving metacognitive strategy training and locus of control orientation still need to be answered.

The learning strategies curriculum developed at the University of Kansas Institute for Research in Learning Disabilities (KU-IRLD) incorporates methods of motivating students throughout the instructional process (Deshler & Schumaker, 1986). It is important for students with learning disabilities to become aware of how they learn (i.e., develop metacognitive awareness) and how they can take control of their learning (Brown, 1980). A major goal of the KU-IRLD learning strategies curriculum is to help students understand that they must be active participants in the learning process to assume control of the learning situation (Deshler & Schumaker, 1986). The students' active participation is enlisted through a variety of techniques such as obtaining student commitment to learn the strategy, having students set goals for learning, training students to evaluate their own progress toward those goals, and eliciting students' rationales for learning and eventually generalizing the strategy (Deshler & Schumaker, 1986).

Students with learning disabilities have significant problems passing required courses due to their poor test-taking skills (Alley, Deshler, & Warner, 1979; Hughes & Schumaker, 1991). Included within the KU-IRLD learning strategies curriculum is the Test-Taking Strategy (Hughes, Schumaker, Deshler, & Mercer, 1988). The authors of the Test-Taking Strategy noted that when students use the strategy they become active participants in the test-taking process. Specifically, the Test-Taking Strategy provides students with a comprehensive strategy coupled with test-wiseness principles that can be applied in a variety of testing situations. Further, students learn how to take control of the testing situation and calm themselves through self-talk (i.e., saying positive affirmations). Putnam, Deshler, and Schumaker (1993) reported that use of the comprehensive routines in the Test-Taking Strategy has significantly changed the degree of active participation of the student in the test-taking process. Measures of locus of control orientation resulting from this type of educational intervention have not been reported.

Rationale of the Study

Since the beginning of the 20th century, researchers have been investigating how motivation affects learning and how learning affects motivation (Mehring & Colson, 1990). There is general agreement among educators that a critical link exists between motivation and learning. A substantial body of research exists on motivational deficits among

students with learning disabilities (Lewis & Lawrence-Patterson, 1989). Finding ways to increase motivation and improve school performance for students with learning disabilities continues to be the central theme at professional conferences and in the literature related to effective interventions in special education. Questions remain about what techniques are effective in motivating students with learning disabilities.

In an attempt to understand the motivational deficits among students with learning disabilities, researchers have examined the theoretical construct of locus of control (Rotter, 1966). The construct of locus of control has been used to describe whether students believe that reinforcements such as grades, are due to their own actions (i.e., internal locus of control) or due to factors beyond their control (i.e., external locus of control) (Bryan & Pearl, 1979). An internal locus of control indicates that outcomes are perceived to be the result of one's own ability or effort, whereas an external locus of control indicates that outcomes are perceived to be the result of luck, powerful others, or other factors beyond the individual's control (Rotter, 1990). Further, locus of control has been found to be related to academic performance (Tarnowski & Nay, 1989). There is general agreement in the literature that successful students tend to have an internal locus of control (Lewis & Lawrence-Patterson, 1989). Moreover, Omizo and Cubberly (1983) reported that students with an internal locus of control are

more curious, inquisitive, perceptive, efficient in information processing, better able to delay gratification, superior in incidental learning, and more successful in school-related tasks.

A number of investigators have found that students with learning disabilities differ from students without learning disabilities on measures of locus of control. Specifically, students with learning disabilities tend to have a more external locus of control for reinforcement which further disadvantages them in the school setting (Mehring & Colson, 1990). Whitmore (1980) asserted that when students perceive that they have no control over classroom events they develop "an attitude of impotence and resignation" (p. 180). This notion of powerlessness is similar to Rotter's (1966) social learning theory concept of internal-external locus of control. An external locus of control is expressed in the belief that one cannot influence outcomes. Thus, since students with learning disabilities tend to behave as if failure were inevitable (Ryan, Short, & Weed, 1986), motivational factors must be considered in developing interventions for these students.

For over a decade, the literature has reflected a growing interest in the use of cognitive strategy intervention with students with learning disabilities. One area of cognition, metacognition, has generated substantial research in special education. Metacognition is a theoretical construct. According to Flavell (1979),

metacognitive knowledge consists of three types of variables: knowledge about oneself as a learner, analysis of task demands, and strategy choices. Knowledge about oneself as a learner includes factors such as how well an individual remembers things, if an individual generally does better on reading tasks than on writing tasks, and if an individual prefers to learn auditorily rather than visually. Analysis of task demands includes making predictions about how well an individual thinks he can perform a task. Strategy choices involve evaluating how well an individual solves a problem with a given strategy. There is evidence that metacognitive skills can be taught to students with learning disabilities and that this training can have a positive effect on academic achievement (Wong, 1987).

The focus in metacognitive instruction is both behavioral and cognitive. Thus, knowledge is not distinct from what one does; knowledge and behavior are interactive (Hagen, Barclay, & Newman, 1982). In metacognitive instruction, educators look beyond learner characteristics and the content of instruction, and place emphasis on empowering the learner (Wong, 1986).

Taking charge of one's learning implies that the student is an active participant in the learning process. This is not always the case among students with learning disabilities. Torgesen (1982) has described students with learning disabilities as inefficient, inactive, and disorganized learners. Wong (1987) has noted that students

with learning disabilities lack knowledge of their cognitive strengths and weaknesses and are unaware of or deficient in strategies to approach, size up, and solve tasks. It is precisely this passive, unmotivated, and dysfunctional approach to learning among students with learning disabilities that needs to be altered. To address this issue, Ryan, Short, and Weed (1986) recommended that educators teach students with learning disabilities to effectively monitor task performance and to believe they can control task outcomes through effort. Thus, the development of metacognition and an internal locus of control for students with learning disabilities has become a recent goal in special education.

In view of recent efforts to understand the links between an external locus of control and poor performance on school-related tasks, further investigation of locus of control among students with learning disabilities is warranted. In particular, knowledge about educational interventions that can influence the locus of control orientation of students with learning disabilities is important.

One possible educational intervention is the learning strategy approach (Deshler & Schumaker, 1986) in which motivational and metacognitive principles are incorporated. According to Deshler and Schumaker, learning strategies are "techniques, principles, or rules that enable a student to learn, to solve problems, and to complete tasks

independently" (p. 583). Deshler and his colleagues at the University of Kansas-Institute for Research in Learning Disabilities (KU-IRLD) have developed and validated the learning strategies curriculum through more than 14 years of programmatic research. Primarily developed as an intervention for adolescents with learning disabilities, the learning strategies approach emphasizes the development of individual responsibility.

Unlike most learning strategies that tend to be unidimensional (Groteluschen, Borkowski, & Hale, 1990), the learning strategies developed at KU-IRLD are comprehensive strategy "systems" (Hughes & Schumaker, 1991). Hughes and Schumaker (1991) noted that "one learning strategy can include some simple cognitive strategies (i.e., rehearsal, paraphrasing, self-questioning), some metacognitive strategies, as well as other behaviors" (p. 239). For example, the elements of the strategy system that have been developed for the Test-Taking Strategy (Hughes, Schumaker, Deshler, & Mercer, 1988) include (a) learning a list of steps at an automatic level through the use of a mnemonic device (PIRATES), (b) writing one's name on a test, (c) saying positive affirmations before one begins a test, (d) eliminating obviously wrong choices on a test, and (e) surveying the test to make certain there are no unanswered items. Hughes and Schumaker asserted that the Test-Taking Strategy is a comprehensive strategy system that is "more than the sum of its parts. It is a set of learning

patterns that students can use in a creative way by mixing and matching its parts . . . to independently meet the demands of a given learning task" (p. 241). Moreover, Hughes and Schumaker support the need for future research on the affective impact of learning a comprehensive test-taking strategy (the Test-Taking Strategy).

The learning strategies approach fosters the students' belief that they, rather than others, are primarily responsible for their learning and progress. Since this rationale fits the description of an internal locus of control orientation, training in a learning strategy such as the Test-Taking Strategy (Hughes, Schumaker, Deshler, & Mercer, 1988) may promote a more internal locus of control orientation among students with learning disabilities. Moreover, since the Test-Taking Strategy was designed to be sufficiently powerful to improve the grades of students with learning disabilities in the regular classroom (Putnam, Deshler, & Schumaker, 1993), it appears to be a particularly promising intervention for increasing the likelihood that students with learning disabilities will perceive themselves as having a more internal locus of control orientation.

Statement of the Problem

The present study focused on the effect of a complex cognitive strategy intervention on the locus of control orientation of students with learning disabilities. There was one fundamental question related to this problem: Does training in a comprehensive test-taking strategy that

incorporates metacognitive and motivational principles affect the locus of control orientation of middle school students with learning disabilities?

Groteluschen, Borkowski, and Hale (1990) stated that students with learning disabilities need to be taught "how to make their efforts pay off and to deploy strategies successfully. Increased success following strategy use should strengthen feelings of personal control, which should, in turn, fuel future executively governed strategic behavior" (Groteluschen, Borkowski, & Hale, 1990, p. 97).

The question of the impact of complex strategy training on the locus of control measures was important to study for several reasons. First, the study would address the impact of participation in complex cognitive strategy training on the locus of control orientation of students with learning disabilities. Second, the study would extend the empirical literature on the affective effects of learning a test-taking strategy system. Finally, significant findings would lend support to the locus of control construct, as well as to the overall social learning theory.

Statement of Purpose

The study was primarily designed to investigate the locus of control orientation of students with learning disabilities prior to and after participation in a complex strategy intervention that focused on test-taking strategies. The impact of the complex strategy training on locus of control orientation was determined by analyzing the students'

pretest and posttest scores on two measures of locus of control. A criterion measure, a behavioral indicator of the dependent variable, was included. Of secondary interest was the effectiveness of the strategy training on the students' test-taking skills. Also of interest was the students' and their teachers' evaluation of the strategy.

Definition of Terms

The following section presents terms and their definitions as used in this study. Terms selected for inclusion are critical to understanding implementation procedures and observed results.

Expectancy is the probability that reinforcement will occur as a result of one's action and is a component of social learning theory (Rotter, 1954).

External control is also referred to as externality and is a perception that reinforcement is under the control of others or subject to a complex array of forces beyond one's control (Rotter, 1990).

Internal control is also referred to as internality and is a perception that reinforcements are contingent upon effort, behavior, or personal characteristics such as ability (Rotter, 1990).

Learning disability (LD) refers to a disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations.

The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage (United States Office of Education, 1987, p. 65083, as cited in Mercer, 1992).

Locus of control (LOC) refers to the extent to which individuals expect that reinforcement or outcomes are contingent upon their own actions or personal characteristics (internal) versus the degree to which individuals expect that reinforcement is due to chance, luck, fate, or powerful others (external) (Rotter, 1990).

Social learning theory (SLT) is the concept that an individual develops generalized expectancies about future situations based on past experiences (Rotter, 1954).

Delimitations of the Study

The scope of this study was delimited in three ways. First, the study was delimited by geographical restriction to Ocala, Florida, a medium-sized city located in Marion County, in the north central portion of the state. Second, only students with LD were included in this study. Third, only students in middle school grades were considered for this study.

Limitations of the Study

Since this study included only middle school students with LD, the findings should not be generalized to other groups of students with or without disabilities. Moreover, the generalizability of the study findings may be limited by the unique personal and learning characteristics of the subjects. Caution should be exercised in extrapolating results of the study to other students with learning disabilities living outside Marion County. Finally, the Test-Taking Strategy is one of several learning strategies included in the KU-IRLD learning strategies curriculum; therefore, results based on this particular strategy cannot be generalized to other KU-IRLD or non-KU-IRLD learning strategies without replication.

Summary

The current trend is toward increased research involving successful interventions for students with LD. Substantial research exists on the link between an internal LOC and success in school. Relatively little research on the development of an internal LOC has been conducted with students with LD. It was the intent of this study to contribute information regarding the effectiveness of teaching students with LD a comprehensive test-taking strategy system. Specifically, students' LOC orientation was investigated.

A review of the literature relevant to this study is presented in Chapter 2. Research methodology and procedures

are presented in Chapter 3. The results of the present study are provided in Chapter 4. Finally, a discussion and interpretation of the findings are contained in Chapter 5.

CHAPTER 2
REVIEW OF RELATED LITERATURE

Introduction

The purpose of this chapter is to summarize and analyze existing professional literature that supports the need to alter locus of control (LOC) for students with learning disabilities (LD) through training in a comprehensive strategy system that incorporates principles from metacognition and motivation research. The chapter is divided into four major sections. First, an historical summary of motivation theories, social learning theory (SLT), and the LOC construct are presented as a theoretical frame of reference for the present study. Second, basic principles of metacognitive strategies are presented. Third, a description and critique of research involving direct attempts to alter LOC for students with LD are presented. Finally, the chapter concludes with a summary and implications of previous research as it relates to the present study.

Motivation

Understanding student motivation has been a long-standing priority in educational research. Implicit in this literature is the assumption that motivation is a crucial factor in academic success. According to Adelman and Taylor (1993), "motivation is a prerequisite to learning, and its absence may be the cause of learning problems, a factor

maintaining such problems, or both" (p. 163). An understanding of motivation theories is critical in understanding why some students lack motivation to achieve. Traditional explanations for this problem include constructs from cognitive and noncognitive motivation theories.

Noncognitive Theories

Noncognitive approaches to motivation include instinct theories and needs/drives theories. Early in the 20th century, psychologists used the term, "instinct" to explain all social behavior.

Instinct theory. Instinct theorists believed that individuals were destined to behave in certain ways. This perspective supported the notion that individuals are not in control of initiating or sustaining their own behavior. Thus, according to instinct theory, individuals achieve because they possess an innate (unconscious) tendency to achieve. In contrast, individuals who do not achieve, do not possess the achievement instinct. By the mid-1920s, however, instinct theory was rejected by drive theorists as an inadequate and unscientific explanation of motivation (Mehring & Colson, 1990).

Needs/drives theory. According to needs/drives theory (Maslow, 1979), the two components of motivation are needs and drives. Needs are based on some physiological deficit (i.e., water, food, sleep, and so forth) or psychological deficit (such as approval, affection, power, and so forth) within the person. According to Maslow, when needs are not

satisfied, the individual experiences a drive to restore physical or psychological balance. In other words, the individual becomes motivated to satisfy a physical or psychological need. However, Maslow's theory has been criticized (Mehring & Colson, 1990), since human behavior has not always been satisfactorily explained by the needs/drive theory.

One of the most popular theories of motivation is the achievement motivation theory (Atkinson & Feather, 1966). According to Atkinson and Feather (1966), achievement motivation refers to an individual's personality trait or motive (i.e., a need to achieve) that is stable (i.e., resistant to distraction or frustration) and measurable. The desire for success and the fear of failure are the two primary motives for engaging in achievement-oriented behavior. Atkinson and Feather differentiate individuals with high and low achievement motivation based on the individual's preference for tasks of high, medium, and low difficulty. The achievement motivation theory holds that individuals with high need achievement tend to choose learning tasks with a moderate level of difficulty, i.e., learning tasks that not only present some degree of challenge but also a high probability of success for the individual. On the other hand, individuals with a low need achievement tend to choose learning tasks that present either no challenge or high challenge, i.e., tasks that are very difficult or too difficult for all individuals.

Drive theorists dismissed assumptions about instinctive or unconscious behavior motives. According to drive theorists, behavior motives are learned or acquired, not innate (Mehring & Colson, 1990). Hull (1952) proposed that motivation was a function of the relationship between an individual's performance and the immediacy and amount of reinforcement. One of the fundamental concepts of Hull's theory is that the amount of reinforcement changes the motivational level of the individual which, in turn, affects performance. Thus, Hull's theory provides a bridge between noncognitive and cognitive theories of motivation.

Cognitive Theories

Central to cognitive theory is the assumption that individuals are motivated by factors other than external variables or biological needs. A number of cognitive-motivational theorists have postulated that students' beliefs about their abilities and efforts influence their performance in achievement situations (Licht, 1993). For example, locus of control theorists (Crandall, Katovsky, & Crandall, 1965; Nowicki & Strickland, 1973) stress the importance of attributing academic successes and failures to "internal" variables, such as effort or ability, rather than attributing success or failure to "external" variables, such as fate or luck. Similarly, attributional theorists (Dweck, 1975; Weiner, 1976) discuss the importance of attributing academic failure to controllable variables, such as lack of effort, as opposed to attributing academic failure to uncontrollable

variables, such as lack of ability. Finally, self-efficacy theorists (Bandura, 1982; Schunk, 1989) postulate that the student's own perception of academic competence is an important determinant in achievement behavior.

Attribution theory. The role of attributions is a recurring theme in the literature on motivation. The attributional theory of achievement motivation proposed by Weiner (1976), incorporates cognitive and motivational constructs in an achievement-related context. To understand the causes of one's behavior, an individual postulates attributions about who or what was responsible (Weiner, 1986). Specifically, causal attributions resulting from learning outcomes reinforce the student's beliefs, behavior, and self-concept (Weiner, 1976). Weiner (1986) classified attributions along three dimensions: (a) the source (locus) of control, (b) stability, and (c) controllability. The source of control can either be internal or external. This dimension of source of control is based on Rotter's (1966) concept of locus of control. According to Rotter (1966), individuals with an internal locus of control attribute their success to their own efforts while individuals with an external locus of control believe that people or forces outside of themselves are responsible for their success or failure. The stability dimension, another characteristic of attribution, refers to an individual's expectations about the future. Accordingly, students attribute their success to a stable variable such as ability or to an unstable,

nonpredictable variable such as luck. Attributions also differ along the controllability dimension which is related to confidence and future expectations. Thus, individuals believe that causes of success are either within or beyond their control.

Long-standing beliefs about personal causality are referred to as antecedent attributions (Borkowski, Weyhing, & Carr, 1988). Weiner's (1976) model of achievement motivation has been employed widely to investigate how antecedent, causal attributions influence achievement-related behavior (Aponik & Dembo, 1983; Marsh, 1986; Stipek & Weiz, 1981). However, more recent research has focused on how to alter negative antecedent attributions of students with learning difficulties through attributional retraining (Borkowski, Weyhing, & Carr, 1988; Reid & Borkowski, 1987; Shelton, Anastopoulos, & Linden, 1985).

Attributional retraining. Borkowski, Weyhing, and Carr (1988) postulated that antecedent attributions may be altered by a combination of attributional retraining and instruction in a reading comprehension strategy. Specifically, the researchers investigated the effects of attributional retraining on the students' use of a reading comprehension strategy and on the students' long-standing, antecedent, attributional beliefs.

Participants in this study were 75 students with reading disabilities. Students ranged in ages from 10 to 14. The researchers, however, provided no information on the

students' average or range of measured intelligence as recommended by Rosenberg et al. (1992). Students were randomly assigned to one of four conditions: Reading Strategies Plus Complex Attribution (N = 18), Reading Strategies Plus Attribution (N = 17), Attribution Control (N = 19), and Reading Strategies Control (N = 21). All students were pretested and posttested using the following assessment techniques: (a) an antecedent attributions questionnaire developed by the researchers, (b) an explanatory paragraph summarization by the student, and (c) the Stanford Diagnostic Reading Test (reading comprehension subtest). Additionally, teacher ratings on the Conners (1969) test of impulsive behavior and estimations of students' reading levels were obtained as pretest measures.

Participants in the main experimental condition, Reading-Strategies-Plus-Complex-Attributions, received attributional retraining on paired-associate and sort-recall tasks (that were unrelated to the Stanford Diagnostic reading comprehension subtest), instructions on the use of a summarization strategy, and examples of attributional statements about the efficacy of the instructed strategy. Students in the Reading-Strategies-Plus-Attributions experimental condition received the same treatment as the participants in the main experimental condition with the exception of the attributional retraining on the paired-associate and sort-recall tasks. Participants in one control condition (Attribution Control Group) received training in

the reading comprehension strategies without attributional retraining or modeling of attributional statements about the efficacy of the instructed strategy. Participants in the second control condition (Reading Strategies Control Group) received neither strategy nor attribution training.

Training sessions ranged from three to five sessions over a 2-week period. Posttesting occurred one week after training and again two weeks later. The researchers utilized an analysis of covariance (ANCOVA) to determine effects on (a) paragraph summarization, (b) reading comprehension subtest scores, and (c) antecedent attributional beliefs.

The researchers reported the following results:

1. A significant main effect for conditions ($F\ [3,68] = 4.18$, $p < .05$) with regard to paragraph summarization. Follow-up contrasts yielded a significant difference ($F\ [1,68] = 9.89$, $p < .05$) that showed the effectiveness of attributional training with regard to paragraph summarization.

2. No significant effects attributable to conditions on total scores for the Stanford Diagnostic reading comprehension subtest were found. The researchers then conducted two ANCOVAs to compare the combined attributional conditions with the control conditions in terms of Literal and Inferential subscale scores from the Reading Comprehension subtest. No difference was found on the Literal subscale; however, students in the attributional

conditions performed significantly better than those in the control conditions on the Inferential subscale.

3. No mean differences emerged as a function of sessions or training conditions with regard to antecedent attributional beliefs. All effects were nonsignificant. Further analyses of the relationship between attributional beliefs and summarization scores revealed that for participants in the Reading-Strategies-Plus-Complex-Attribution condition, attributions for success at pretest correlated significantly with summarization scores at the first posttest, $r(16) = .63$.

The researchers concluded that preexisting attributional beliefs may have predisposed some participants in the Strategies-Plus-Complex-Attributions condition to benefit from training more than the other participants. Borkowski, Weyhing, and Carr (1988) stressed the importance of continued research to alter long-standing antecedent beliefs that may impact a wide range of academic behaviors.

Using Harber's (1981) guidelines for critically evaluating research, the following problems emerge in the Borkowski, Weyhing, and Carr (1988) study: (a) the lack of definition and criteria for the "reading-disabled" population in this study, (b) the absence of information on the range of intellectual ability, (c) the possibility of bias in the selection of tests, (d) the separate analysis of the two subscales of the Reading Comprehension subtest and the subsequent conclusions drawn from those results, and (e) the

absence of data in the form of pretest and posttest group means and standard deviations for the generalization and standard deviations for the generalization effects (i.e., the Stanford Diagnostic Reading Test). Finally, the researchers' finding that the participants' attributional beliefs were resistant to change also may have been the result of (a) the short treatment duration or (b) the specific subtype of learning disability (neurologically based decoding deficit) that may have prevented some of the students from benefiting from attributional or strategy-based interventions.

Shelton, Anastopoulos, and Linden (1985) investigated the effects of attribution training on the antecedent attributions and specific academic behaviors of fourth and fifth grade students. Following pretesting with the Intellectual Achievement Responsibility (IAR) Questionnaire (Crandall, Katovsky, & Crandall, 1965), the Effort versus Ability (E/A) Failure Attribution Scale (Dweck, 1975), the Coopersmith Self-Esteem Inventory (CSEI) (Coopersmith, 1967), and further screening to determine reading levels and reading persistence, 16 students with learning disabilities and 16 students without learning disabilities were assigned randomly to one of two conditions: attribution training or control.

Attribution training was conducted over two, 30-minute sessions per week for 3 weeks. Participants in the experimental condition listened to a recording of a child (same sex as the subject) saying a positive attributional

statement after a hypothetical task that resulted in success and then, subsequently, in failure. Participants were prompted by the researcher to repeat the attributional statements at the beginning of each training sessions. After the participants practiced the statements, they were asked to read aloud sentences that varied in terms of difficulty level. Participants were reminded to use the appropriate attributional statements after a successful reading and after an unsuccessful reading. Posttests were administered to all participants 1 day following and 2 weeks after the completion of the training program.

Repeated measures analysis of variance were computed on the reading persistence, IAR Total and IAR Effort, E/A Scale, and CSEI scores. Statistically significant Trials by Condition interactions were found for reading persistence ($F\ [2,56] = 12.36$, $p < .01$), IAR Total ($F\ [2,56] = 7.79$, $p < .01$), IAR Effort ($F\ [2,56] = 10.07$, $p < .01$), and the E/A Scale scores ($F\ [2,56] = 10.49$, $p < .01$). Contrary to the researchers' hypothesis, attribution-training did not result in significant improvement in self-esteem (CSEI).

Newman-Keuls analyses indicated that participants who received attributional training were significantly more persistent on the reading task than the control participants at both posttest and follow-up ($F\ [1,84] = 22.90 < .01$, and $F\ [1,84] = 6.72$, $p < .01$, respectively). Participants who received attributional training attributed a significantly greater number of achievement outcomes to internal factors

(IAR Total scores) and significantly more effort attributions (IAR Effort) for failure at posttest than did the control participants ($F [1,84] = 11.13$, $p < .01$, and $F [1,84] = 14.02$, $p < .01$, respectively). However, only the changes in the IAR Effort scores were maintained at follow-up. Finally, participants who received attributional training reported significantly more effort attributions for failure on the E/A Scale at posttest and at follow-up than did control participants ($F [1,84] = 24.88$, $p < .01$, and $F [1,84] = 3.58$, $p < .5$, respectively).

The researchers concluded that alteration of antecedent attributions, especially alteration of effort attributions, and increases in task persistence (in reading) were achieved with relatively brief training (i.e., three total training hours). Shelton, Anastopoulos, and Linden (1985) noted that the results from their investigation support further research in the area of attribution training approaches that may be effective in helping students with learning disabilities "persist in the face of a difficult academic situation" (p. 264). Finally, the results of this investigation provided additional support for hypothesizing that modification of the students' attributional beliefs was related to their increased task persistence in reading. Specifically, when a student in the attributional training condition encountered a difficult sentence, rather than discontinuing the task, the student was both prompted to say positive attributional statements and provided with immediate

and elaborate corrective feedback as needed. The researchers noted that appropriate reading strategies were modeled when the students incorrectly read a sentence. Since the students were provided with strategies to correct reading errors, rather than merely being prompted to repeat attributional statements, it is possible to conclude that the inclusion of appropriate reading strategies may have contributed to the maintenance of gains in reading persistence and in effort-attributions for failure.

Attributions and self-efficacy. It has been hypothesized that self-efficacy, or self-perceptions of competence, influences and individual's allocation of effort and persistence at a task (Schunk & Cox, 1986). Schunk and Cox (1986) postulated that overt verbalizations, that have a behavioral, self-regulatory function, during cognitive strategy instruction would have a positive effect on students' self-efficacy and achievement performance. Participants in their study included 90 middle school students with specific learning disabilities in mathematics. The students were randomly assigned to three groups. One group of students (N = 30) was encouraged to verbalize aloud while they solved subtraction problems. The second group verbalized aloud during half of the sessions and were discouraged from verbalizing aloud during the second half of the sessions. The third group was not encouraged to verbalize while they solved the subtraction problems. Additionally, students either periodically received

attributional feedback (e.g., "You've been working hard.") during the first half of the training program, received effort feedback during the second half of the program, or did not receive effort-attributional feedback.

The researchers hypothesized that the students in the two verbalization conditions would demonstrate increased self-efficacy and subtraction skills at posttest. Moreover, it was hypothesized that effort-attributional feedback would increase students' self-efficacy and subtraction skills.

Schunk and Cox (1986) developed the rationale of their investigation based on the work of Vygotsky (1962), Bandura (1982), and Meichenbaum (1977). Vygotsky (1962) asserted that overt verbalization as a form of "private speech" has a behavioral, self-regulatory (metacognitive) function. Bandura (1982) postulated that overt verbalization is a means of regulating one's performance that also promotes the learner's sense of personal control which, in turn, promotes a perception of self-efficacy. Lastly, the positive effects of self-verbalization on children's performance has been noted (Meichenbaum, 1977).

The training sessions lasted for 45 minutes, over 6 consecutive school days. Posttests were administered to all students. Posttest measures included the (pretest) attributional-assessment (a student rating scale), the (pretest) self-efficacy assessment (a rating scale designed to measure the student's own perceptions of their capability to solve subtraction problems), and the subtraction skill

test. There were two forms (pretest and posttest) of the subtraction skill test that tapped various regrouping operations.

A multivariate analysis of covariance (MANCOVA) yielded significant main effects for verbalization, Wilk's lambda = .642, $F(4,156) = 9.69$, $p < .001$, and effort feedback, Wilk's lambda = .740, $F(4,156) = 6.34$, $p < .001$. The Verbalization x Effort Feedback interaction was nonsignificant. Planned comparisons applied to the posttest self-efficacy measure indicated that verbalization conditions led to higher self-efficacy than the no-verbalization condition; continuous verbalization led to higher self-efficacy than discontinued verbalization; and providing effort feedback promoted self-efficacy more than not providing effort-attributional feedback. Planned comparisons also showed that the verbalization conditions demonstrated higher subtraction performance than the no-verbalization condition; continuous verbalization promoted skill in subtraction, more than discontinued verbalization; and effort-attributional feedback increased skill in subtraction, more than no feedback.

The researchers concluded that overt verbalization during the problem-solving process enhanced task performance in subtraction and self-efficacy. However, as Schunk and Cox (1986) point out, the study did not specify the process by which overt verbalization enhanced subtraction skills. Thus, the exact relationship of attributions, self-efficacy, and performance is undetermined.

However, other researchers (Singer, 1978) have postulated that attributes, expectancy of success, and task performance may be related as described in Figure 1. Singer (1978) hypothesized that both task perception, i.e., sizing up the task, in terms of difficulty and expectancy of success on a task have an impact on one's actual task performance. Further, Singer hypothesized that one's evaluation, i.e., monitoring of performance affects one's attributions which, in turn, affects one's perception of subsequent similar tasks. Singer's (1978) model of the relationship of expectancies and attributions to task performance incorporates motivational theory and principles from metacognition.

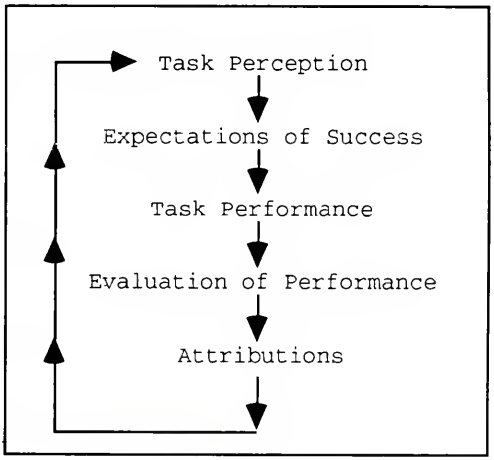

Figure 1. Hypothesized relationship of expectancies and attributions to task performance (adapted from Singer, 1978).

Social Learning Theory

Rotter (1954) advanced a theory of social learning to explain complex social behaviors and postulated a personality construct, locus of control, (Rotter, 1966) that was a precursor of attribution theory. Social learning theory (SLT) (Rotter, 1954) represents an attempt to integrate three broad historical trends in psychology: behavior, cognition, and motivation. In SLT, an individual's behavior in a given situation is determined by three variables: expectancy (cognition), reinforcement value (motivation), and the specific situational context. Expectancy, the first variable in SLT, refers to the probability that reinforcement will occur as a result of one's behavior. Expectancy for internal versus external control of reinforcement (locus of control) is independent of reinforcement value. Reinforcement value refers to the degree of one's preference for a specific reinforcement over other equally attainable reinforcement. The specific, situational context, the third variable in SLT, refers to the influence of situational specificity or situational generality. According to SLT, one's behavior varies according to the specific, situational context. Thus, a basic assumption in SLT is that an individual's behavior "in different situations will be different, although there may be a gradient of generalization from one situation to another" (Rotter, 1990, p. 491). Social learning theorists view environmental or situational stimuli as cues that provoke expectancies for the success or failure of specific

behaviors (Phares, 1980). In other words, an individual develops expectancies on the basis of previous experience (Rotter, Liverant, & Crowne, 1961). According to Rotter (1954), reinforcement strengthens the expectation that a particular outcome will be followed by that reinforcement in the future. Further, once the pattern of outcome-reinforcement is established, nonoccurrence of reinforcement reduces the expectancy of reinforcement (Bandura, 1977; Rotter, 1966).

The utility of SLT for contemporary motivational theorists has been evidenced in the number of citations (4,700) to Rotter's (1966) monograph since 1966 (Rotter, 1966). Rotter's (1966) monograph outlined the theoretical construct of internal versus external locus of control for reinforcement.

Locus of Control

Expectancy for a reinforcement also depends on the locus of control for that outcome. Control of reinforcement is a generalized expectancy for success (Rotter, 1990). According to Rotter (1990), control of reinforcement is conceptualized as a continuum from an internal to an external orientation. Individuals toward the internal end (internals) of the reinforcement continuum tend to attribute the occurrence of events to their own efforts, while individuals toward the external end of the reinforcement continuum (externals) tend to attribute the occurrence of events to luck, chance, powerful others, or other factors beyond their control.

Researchers report that a developmental trend exists toward internality on LOC measures (Crandall, Katovsky, & Crandall, 1965; Lefcourt, 1976; Nowicki & Strickland, 1973); however, this is not the typical pattern for students with learning disabilities (Fincham & Barling, 1978; Gardner, Warren, & Gardner, 1977). Gardner, Warren, and Gardner (1977) found that students with learning disabilities are more external on measures of LOC than students without disabilities of the same age. Kifer (1975) found that unsuccessful students in grades two, four, six, and eight are more external in their LOC orientation than successful students. He also found that unsuccessful students remain relatively external in their LOC orientation across all grade levels.

The role of locus of control has been firmly established in the research literature on academic achievement. Since the publication of the Coleman Report in 1966, locus of control has been identified as one of the most important variables in accounting for variance in academic achievement (Wittrock, 1986). Researchers (Bar-Tal & Bar-Zohar, 1977; Brooks & Hounshell, 1975; Crandall, Katovsky, & Crandall, 1965; Duke & Nowicki, 1974; Findley & Cooper, 1983; Lefcourt, 1976) have concluded that an internal orientation is positively related to achievement.

Based on a review of the research literature, Laffoon, Jenkins-Friedman, and Tollefson (1989) concluded that students who underachieve tend to report an external LOC more

than their achieving peers. However, the authors found inconclusive results regarding the relationship between LOC and high academic aptitude. Therefore, they conducted a study to determine differences in LOC among achieving gifted, underachieving gifted, and nongifted students. Participants were students in grades three, four, and five in two midwestern school districts. The researchers found that gifted underachievers and nongifted students were significantly more external in their LOC orientation than achieving gifted students ($p < .05$). These results support a large body of research that suggests a positive relationship between internal LOC and academic achievement.

Researchers have begun to examine locus of control (LOC) in relation to metacognition. An internal LOC is believed to be one of the motivational correlates of metacognition (Flavell, 1987; Groteluschen, Borkowski, & Hale, 1990; McCombs, 1989; Singer, 1978). Flavell (1987) has postulated that one's developing sense of self "as an active cognitive agent and as the causal center of one's own cognitive activity" may possibly contribute to the development of metacognition (p. 26). Flavell elaborated that the "development of such an internal locus of cognitive control could promote the monitoring and regulation of one's own cognitive enterprises" (p. 26).

According to McCombs (1989), self-esteem, locus of control, and attributional beliefs can be viewed as part of a larger "self system" that appears to impact the development

of metacognition as well as the quality of academic performance. Further, it has been postulated that metacognition and LOC are bidirectionally related, "each contributing to the development of the other" (Groteluschen, Borkowsi, & Hale, 1990, p. 87). Finally, Singer (1978) noted that "expectations, performance levels, and attributions (causations of performance attributed to internal or external variables) appear to be interrelated according to cognitive motivational theory" (p. 102).

Metacognition

Metacognition is a theoretical construct. According to Flavell (1979), metacognitive knowledge consists of three types of variables: (a) knowledge about oneself as a learner, (b) analysis of task demands, and (c) strategy choices. Knowledge-about-oneself-as-a-learner includes factors such as (a) how well one remembers things, (b) if one generally does better on math tasks than on writing tasks, and (c) if one prefers to learn auditorily rather than visually. Analysis-of-task-demands includes making predictions about how successfully one may perform a specific task. Strategy-choices refers to evaluating how successfully one employed a specific strategy to solve a problem. The literature on metacognition includes the following terms: metamemory, metacomprehension, meta-attention, self-monitoring, executive control, self-instruction, and executive processing. These terms represent a sample of the

numerous terms found in the literature that have been used interchangeably with "metacognition."

Shore and Dover (1987) define metacognition as knowledge that enables individuals to make choices among different strategies, to judge the applicability of strategies to specific tasks, and to change or invent strategies to meet task demands. According to Wong (1987), metacognition involves one's knowledge of cognitive strengths and weaknesses as well as an awareness of and ability to use strategies to approach, size up, and solve tasks. To achieve what Swanson (1988) termed a "synchronization of resources," it is necessary to predict, control, and coordinate different cognitive strategies.

One of the essential differences between "expert" and "novice" learners has been attributed to differences in metacognitive knowledge (Rohwer & Thomas, 1989). Expert learners "have metacognitive knowledge that leads them to pose to themselves and to answer three kinds of questions: (a) what (precisely) are you doing, (b) what is the reason for doing it, and (c) how will the results be used later in the solution" (Rohwer & Thomas, 1989, p. 107).

Expert learners tend to take charge of their learning (Wong, 1987). Taking charge of one's learning implies that the student is an active participant in the learning process. This is not always the case for students with learning disabilities. Torgesen (1982) and Wong (1987) have described students with learning disabilities as inefficient, inactive,

and disorganized learners. A similar profile has been attributed to students described as "low achievers." Deshler and Schumaker (1986) note that low achieving students and students with learning disabilities are passive learners who lack knowledge of their cognitive strengths and weaknesses. There is evidence that the traditional profile of the low achieving student as a passive, inactive, learner can be changed. Warren and Iannacone (1959) found that students with average intellectual ability who underachieve made significant academic gains after they were encouraged to participate in planning how they would work on academic tasks. Derry and Murphy (1986) found that students' grades improved after training in goal setting and monitoring progress toward goal attainment. The importance of setting learning goals to increase motivation is emphasized.

Brown (1988) noted the important role of motivation in increasing the likelihood that students will engage in spontaneous and successful metacognitive strategies. Borkowski, Estrada, Milstead, and Hale (1989) postulated that task persistence and expectancy of success are attributes of students who see a connection between using strategic behavior and succeeding at a task. According to Borkowski, Weyhing, and Turner (1986), motivation and effort are essential components in self-regulated learning.

Motivational Aspects of Metacognition

A number of researchers (Boekaerts, 1986; Corno, 1986; Dart & Clarke, 1991; Derry, 1990; Graham & Golan, 1991;

McKeachie, 1987; Mealy, 1990; Paris & Winograd, 1990; Schmitt & Newby, 1986; Short & Weissberg-Benchell, 1989; Switzky & Haywood, 1992; Weinert, 1987) have reviewed the literature and have postulated a link between metacognition and motivation and subsequent implications for the teaching-learning process. However, relatively few researchers have attempted to empirically relate motivational variables to general principles of metacognition.

Graham and Golan (1991) conducted two experiments with fifth and sixth grade students who were randomly assigned to either a task-focused motivational condition, an ego-focused condition, or a control condition. Specifically, the researchers combined a motivational variable (task involvement versus ego involvement) with an information-processing variable (depth of processing) in order to examine the effects of motivation on the encoding and recall of verbal information.

Graham and Golan (1991) distinguished task involvement, in which the focus of the learner is on the intrinsic value of the task or improving one's mastery of the task, from ego involvement, in which the learner focuses on comparing his self-perceived ability to that of others. The researchers hypothesized that task-involved students would engage in more effortful information processing (i.e., cognitive activities, including metacognitive activities, that require deep processing) than ego-involved students. The researchers found that when the task required deep levels of processing

(i.e., analyzing the verbal information for meaning) and students were provided with an appropriate number of retrieval cues, the students in the ego-involved condition demonstrated significantly poorer recall than students in the task-involved condition. Moreover, even though the ego-involved students performed poorer than the control students, there was no significant difference between the ego-focused students and the control students. Graham and Golan also found no difference between ego-focused students and task-focused students when the learning tasks required only shallow processing. The researchers concluded that being ego-focused versus task-focused can have undermining effects on retrieval of deeply processed information. The researchers might have strengthened their study and more substantially supported their conclusions by including a pretest and posttest measure of the students' level of metacognition.

Switzky and Haywood (1992) investigated the effects of environmental and cognitive self-regulatory influences on self-reinforcement behavior in 32 preschool children. The environmental variables consisted of a stringent-demand condition and a lenient-demand condition. The cognitive variable was defined as motivational orientation, i.e., students were either intrinsically motivated or extrinsically motivated. The purpose of this study was to investigate interactive effects of ability to regulate one's own behavior

(metacognition) and intrinsic motivation in learning and performing a task.

The researchers hypothesized that motivational state affected self-reinforcement performance on a motor/attention task. Furthermore, the researchers postulated that learners extract information from the environment (external demand conditions) and use that information to regulate when and how to apply their acquired skills (metacognition). Switzky and Haywood (1992) found that the preschool students in the stringent-demand condition (i.e., students were instructed to set high performance goals and had observed the experimenter model a lean reinforcement schedule) established a higher performance standard and set up leaner schedule of reinforcement (tokens) than did preschool students in the lenient-demand condition (i.e., students were instructed to set a low performance goal and had the opportunity to observe the experimenter model a rich reinforcement schedule). However, extrinsically motivated students outperformed intrinsically motivated students. Nevertheless, intrinsically motivated students set higher performance standards than the extrinsically motivated students in the lenient-demand condition. The researchers concluded that intrinsically motivated students, as young as 3 years of age, may need less teacher guidance, while extrinsically motivated students may require more structure and teacher guidance in order to optimize their learning.

Switzky and Haywood's (1992) study highlights the importance of research that focuses on the development and nurturance of an intrinsic motivational orientation for children. However, questions remain unanswered regarding the role of motivational variables in the learning difficulties experienced by some, "if not all," students with learning disabilities (Deci & Chandler, 1986). Specifically, Deci and Chandler (1986) have argued that the focus of interventions for students with learning disabilities should be on promoting "self-determination by supporting intrinsic motivation and facilitating integrated internalization" (p. 590).

Developmental Trends and Metacognitive Ability

Motivation and effort are not the only variables related to the ability to carry out and monitor cognitive strategies. Chronological age is another variable related to the development of metacognitive ability. There is some evidence that metacognition improves with age (Ormrod, 1990). A developmental trend toward increased metacognitive ability appears to be consistent with a developmental progression toward perception of an internal LOC as discussed earlier in this chapter. Based on a review of the literature on metacognition, Ormrod noted that

1. Older children usually are more accurate than younger children at determining when they have learned something.

2. Younger children typically underestimate how much time they need to learn new information.

Although there is support for the notion that as children get older their metacognitive skills improve, Ormrod (1990) stressed that all students do not automatically become aware of their cognitive strengths and weaknesses as they mature. Ormrod elaborated that "even high school and college students are often metacognitively naive" (p. 293).

Relevant Research on Metacognitive Intervention

Metacognitive deficits also have been found among low-achieving students, especially among students with LD. The ability to make choices among different strategies, to judge the applicability of strategies to specific tasks, to change strategies and to invent strategies to meet task demands is the core of metacognition. Further, it is this ability to exhibit "planful behavior" that facilitates successful strategic behavior (Ryan, Short, & Weed, 1986). The consistent failure of students with learning disabilities (LD) to employ self-regulatory mechanisms to select and attack problems strategically has been well documented (Groteluschen, Borkowski, & Hale, 1990). Researchers (Billingsley & Wildman, 1988; Ellis, Deshler, & Schumaker, 1989; Harris & Graham, 1985; Larson & Gerber, 1987; Palincsar & Brown, 1984; Wong, 1979) have provided a substantial basis for the notion that self-regulated learning occurs when students with LD learn specific strategies. A summary of relevant research on metacognitive intervention with students

with learning disabilities, discussed in the next section, is contained in Table 1.

Table 1
A Summary of Relevant Research on Metacognitive Intervention

Study	Research Question	Subjects	Setting	Design	Results
Harris & Graham (1985)	Does self-control training improve students' compositions?	N = 2 6th grade	Elementary school	Multiple-baseline across behaviors nested within a multiple-baseline across subjects	Students improved and maintained composition skills.
Larsen & Gerber (1988)	Does social meta-cognitive training improve social behavior?	N = 68 16-19 yrs.	Prison	2 factor ANOVA	Training for students with LD & without LD improved social behaviors.
Billingsley & Wildman (1988)	Will prereading activities improve comprehension monitoring?	N = 54	Highschool	MANOVA	Training significantly improved comprehension monitoring skills.
Ellis, Deshler, & Schumaker (1989)	What are effects of executive strategy training on metacognition? Will this training improve regular class performance?	N = 13 Grades 10,11,12	Senior Highschool	Multiple baseline across students	Metacognitive knowledge improved. Task-specific strategies improved. Regular class grades improved.
Palincsar & Brown (1984)	Does reciprocal teaching improve comprehension monitoring in poor readers?	N = 24 Grade 7	Elementary	ANOVA	Training improved comprehension monitoring.
Palincsar & Brown (1984)	Replicated above study.	N = 21 Grade 7	Same, except students worked with regular teacher	ANOVA	Same, plus other improvement in "thinking skills."

Harris and Graham (1985) taught two junior high students with LD task-specific and metacognitive strategies to improve

the quality of their written compositions. In this study, the instructional steps and training components combined cognitive-behavior modification techniques with the KU-IRLD strategy instructional model (Deshler & Schumaker, 1986). Stories written after training received substantially higher ratings than did stories written before training. Generalization and maintenance effects were also addressed in this study. Both students verbalized knowledge of the strategies 14 weeks after training was terminated; however, implementation of these strategies was found not to be consistent. Since training was terminated prior to the end of the school year, the authors explained the lack of generalization by suggesting that the students might have benefited from a "booster session" after the summer vacation from school.

Billingsly and Wildman (1988) investigated the effects of prereading interventions on comprehension monitoring (a metacognitive skill) for adolescents with learning disabilities. The researchers found that, when given a structured overview and an opportunity to ask clarifying questions prior to reading a passage, the students' ability to detect errors embedded in the passage (comprehension monitoring) improved. The researchers also found that self-questioning, unsupported by other interventions, was insufficient to improve performance. The researchers recommended the addition of an advance organizer as well as a structured overview to enhance comprehension monitoring.

The traditional idea that students should engage in periodic self-questioning while reading has become a popular classroom intervention (Brown & Palincsar, 1982). Two landmark studies in the area of comprehension monitoring were conducted by Palincsar and Brown in 1984. Although the students in these studies were not labeled "learning disabled," they were identified as "poor readers" by their classroom teachers. In the first study, the researchers compared the performance of students who received training in either a reciprocal teaching intervention or a locating-information strategy with the performance of students in control groups.

Reciprocal teaching involves both teacher and student(s) taking turns in conducting a dialogue session related to written material. At first, the teacher models the critical behaviors: (a) generating questions about the written material and summarizing the content, (b) talking about the content and clarifying, if necessary, and (c) anticipating (predicting) what will come next. Gradually, the student(s) lead the dialogue.

The results of this study indicated that five of the six students who received the reciprocal teaching intervention increased their comprehension accuracy rate from 20% to 60%. In addition, the researchers found that the students' newly acquired skills transferred to new tasks. The second study was essentially a replication of the first study; however, in the replication study training for the students was provided

by the students' classroom teachers in (remedial) resource-type settings or in the regular classroom. The results of the replication study indicated that, with minimal instruction, classroom teachers effectively implemented the reciprocal teaching method in their classrooms. All students in the second study demonstrated improved comprehension skills. The effects of the reciprocal teaching intervention maintained over an 8-week period with no drop in performance. In addition, generalization to the regular classroom setting was obtained. Finally, the researchers reported a social validity measure; the teachers who participated in the studies were very satisfied with the progress their students made in reading comprehension, in overall "thinking skills," and in the utilization of the reciprocal teaching activities.

Larsen and Gerber (1987) investigated the effects of social metacognitive training for incarcerated delinquents with and without learning disabilities. The focus of this intervention was on developing metacognitive awareness and social metacognitive controls. All participants received the metacognitive training. The authors found a positive relationship between social metacognition and overt social behavior. A combination of verbal self-instruction, direct instruction in social skills, metacognitive awareness in social situations, and metacognitive controls skills (i.e., how to think and problem-solve in social situations) significantly improved social behavior in terms of the reduced number of "negative" behavior incidents reported by

staff. The researchers concluded that social metacognitive intervention may hold promise for students with LD who are at risk for delinquency.

What are the effects of executive strategy training? Does it increase metacognitive knowledge? Will this training improve regular class performance? These questions were answered by Ellis, Deshler, and Schumaker (1989) when they studied the effects of a metacognitive intervention on the ability of students with learning disabilities to create and modify task-specific strategies. The researchers focused on (a) metacognitive knowledge about inventing and modifying strategies, (b) the ability to create problem-solving strategies for new situations, and (c) the effects of the intervention on the students' regular classroom grades and their teachers' opinions about the students' levels of independence and work habits.

Metacognitive knowledge was measured by means of a structured interview with each student. The researchers looked for generalization effects across several mainstream classes. Dramatic grade increases were obtained by many but not by all of the students. The authors explained this effect by suggesting that students who had been earning average (C- or better) grades probably benefited more from the executive process (metacognitive) training than did the students who had been performing in the D and F range. The major assumption in this study was that self-regulated

learning would occur when students learned how to control their own cognitive abilities.

Both motivation and effort are important factors in the learning process (Brown, 1988). Furthermore, students "who see effort as the key to success and believe in their ability to channel it constructively (an internal locus of control orientation) are more likely to seek and acquire higher-order metacognitive skills" (Groteluschen, Borkowski, & Hale, 1990, p. 89).

Strategy Intervention Model

The Strategy Intervention Model (SIM) developed at KU-IRLD was designed to address the academic and social demands that adolescents with learning disabilities typically encounter at the secondary level (Deshler & Schumaker, 1986). The SIM includes complex learning strategies that enable adolescents with learning disabilities to cope with the academic, motivational, executive, and social demands of the secondary school.

Most students with learning disabilities at the secondary level are placed in mainstream classes for a portion of the day (Mercer, 1992); therefore, they need to be successful in coping with general education setting demands such as taking teacher-made and published tests. Students with learning disabilities have significant problems passing required courses due to poor test-taking skills (Alley, Deshler, & Warner, 1979; Hughes, 1985; Scruggs & Mastropieri, 1988). However, students who learn strategies can improve

their ability to express their knowledge more successfully and thus become more empowered learners (Hughes & Schumaker, 1991).

Learning Strategies

A model for teaching students with learning disabilities, consistent with research on metacognition and motivation, has been developed by Deshler and his colleagues at the University of Kansas-Institute for Research in Learning Disabilities (KU-IRLD). The KU-IRLD learning strategies are designed to help students (a) acquire information from written materials, (b) identify and store important information, and (c) express themselves in writing and demonstrate competence (Deshler & Schumaker, 1986).

As defined by the KU-IRLD staff (1990), a strategy is an individual's approach to a task. It includes how an individual thinks and acts when planning, executing, and evaluating one's performance and outcomes on a task. The instructional procedures used to teach the strategies incorporate effective teaching principles derived from the literature on metacognition and motivation (Pressley, Symons, Snyder, & Cariglia-Bull, 1989).

The Test-Taking Strategy. Included within the KU-IRLD learning strategies curriculum is the Test-Taking Strategy (Hughes, Schumaker, Deshler, & Mercer, 1988). The authors of the Test-Taking Strategy noted that when students use this strategy system they become active participants in the test-taking process. Specifically, students learn how to take

control of the testing situation and calm themselves through self-talk (i.e., stating positive affirmations). Hughes and Schumaker (1991) reported that students trained in this strategy improved their grades in general education classes.

The instructional sequence in the Test-Taking Strategy includes the following components: (a) pretest and student commitment to learn the strategy, (b) description and rationales for learning the strategy, (c) goal-setting, (d) modeling (reciprocal teaching) of the metacognitive components of the strategy, (e) verbal rehearsal involving the use of a comprehensive remembering system, (f) practice in application of the strategy, (g) feedback on the use of the strategy, (h) student monitoring and charting of progress toward goals, and (i) posttest and student commitment to generalize and use the strategy in other settings or situations.

The successful application of cognitive and metacognitive strategies is strongly influenced by motivational factors including a perception of control over learning outcomes (Meltzer, 1993). Accordingly, in the Test-Taking Strategy students are taught that there is a direct relationship between their effective use of the strategy and their performance on classroom tests (Hughes, Schumaker, Deshler, & Mercer, 1988).

Hill (1984), and Hughes and Schumaker (1991b) noted the paucity of research with students that focused on the training of test-taking strategies, test wiseness, and other

factors in the test-taking process. Specifically, Hill stressed that relatively little research on the motivational outcomes of training in test-taking strategies has been conducted. Graham and Harris (1993) also noted that it is reasonable to expect that the cognitive and metacognitive components of strategy training may produce cognitive as well as behavioral and affective changes. Thus, outcome measures that focus solely on behavioral or cognitive changes in test-taking performance, for example, may provide a very narrow picture of strategy effectiveness. Graham and Harris also noted that the researcher's selection of outcome measures should be based on specific components incorporated into the strategy. The Test-Taking Strategy (Hughes, Schumaker, Deshler, & Mercer, 1988) incorporates components designed to improve test-taking skills and to foster the students' belief that they, rather than other people or forces, are primarily responsible for their performance on classroom tests. The description of the Test-Taking Strategy suggests both cognitive/behavioral and affective components. Thus, the use of multiple outcome measures on the effects of this type of intervention is indicated. Based on Kuhl's (1987) action-control theory, a hypothetical relationship between intention to achieve (motivation) and metacognitive knowledge and subsequent task performance is illustrated in Figure 2. Similarly, the hypothesized relationship among the variables in the present study: Strategy intervention, metacognition and locus of control is illustrated in Figure 3.

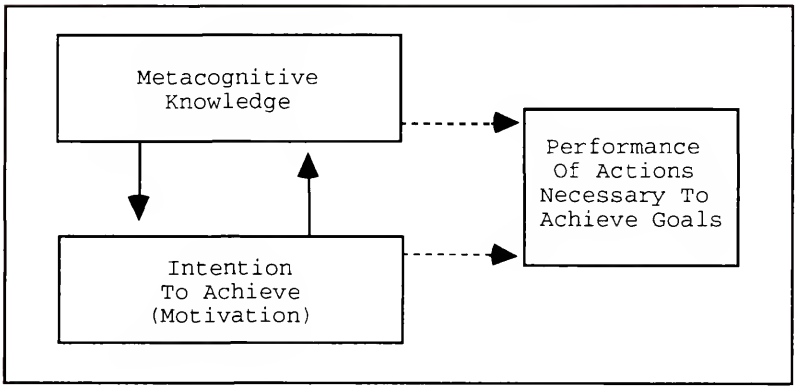

Figure 2. An adaptation of Kuhl's (1987) metacognitive model of action-control.

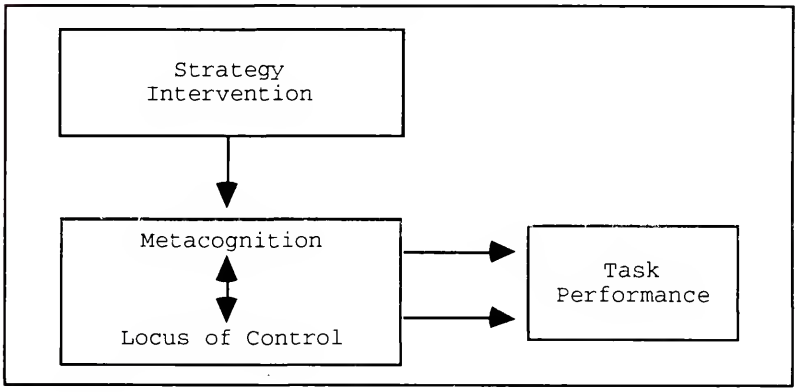

Figure 3. Hypothesized relationship among the variables in the present study.

Effects of Interventions on Locus of Control Among Students with Learning Disabilities

Research on the impact of specific interventions on LOC measures among students with LD is beginning to appear in the professional literature. Typically, researchers have

employed some form of group counseling (Omizo & Cubberly, 1983; Omizo & Omizo, 1987; Omizo, Cubberly, & Longano, 1984) or a rational-emotive education (REE) program (Omizo, Cubberly, & Omizo, 1985; Omizo, Lo, & Williams, 1986), and pretest and posttest measures of LOC (see Table 2). The rationale for the studies included in this review was derived from Rotter's (1954) social learning theory. The studies are discussed and critiqued in terms of their research designs, subject characteristics, measurement methods, and experimental procedures. Finally, study results are reported and summarized.

Research Design

A pre-post randomized control group design was used in all reviewed studies. Experimental and control groups were compared to determine the effects of an intervention on measures of self-concept and LOC for students with LD. All research designs involved one experimental group and one control group. In two studies (Omizo, Cubberly, & Omizo, 1985; Omizo, Lo, & Williams, 1986) procedures were implemented to control for the possible effects of group participation.

Subject Characteristics

The number of subjects in the reviewed studies ranged from 60 (Omizo & Cubberly, 1983; Omizo, Cubberly, & Omizo, 1985; Omizo, Lo, & Williams, 1986; Omizo & Omizo, 1987) to 66 (Omizo, Cubberly, & Longano, 1984). Grade levels were

Table 2
Summary of Research on Locus of Control Interventions

Study	Subjects	Intervention	Dependent Measures
Omizo & Cubberly, 1983	60 students with LD, age range 12-14 years	Reality Therapy (Glasser, 1965) classroom meetings	Dimensions of Self-Concept (DOSC) (Michael & Smith, 1977); Nowicki-Strickland Locus of Control (NSLOC) Scale (Nowicki & Strickland, 1973)

Results: MANOVA results relative to the pretest measures revealed no significant difference between groups. MANOVA results on the posttest measures indicated a significant difference [$F(6,49) = 12.59$, $p < .01$] between groups. Post hoc univariate F's revealed that the LOC measure did not prove to be a significant discriminator between the experimental and control groups.

Comments: Methods of assignment to groups, research design, and analysis were appropriate. Mortality (attrition) in the experimental group may have confounded the results. There was no control for possible effects of group participation (i.e., control group = no treatment). There was no control for teacher effect. Control for teacher variation via teaching scripts may have increased the objectivity of the study. No measure of fidelity to treatment was used. Failure to find a significant difference in groups on the LOC measure may be a function of the nature of the intervention.

Study	Subjects	Intervention	Dependent Measures
Omizo & Omizo, 1987	60 students with LD, age range 12-15 years	group counseling to eliminate self-defeating feelings and behaviors	Coopersmith Self-Esteem Inventory (Coopersmith, 1967); Locus of Control Inventory for Three Achievement Domains (LOCITAD) (Bradley, Stuck, Coop, & White, 1977).

Results: MANOVA results relative to the pretest measures revealed no significant differences between the groups. MANOVA results on the posttest measures indicated a significant difference [$F(7,47) = 14.56$, $p < .01$] between experimental and control groups. Post hoc univariate F's and discriminant analysis procedures revealed that each dependent measure and each of the three domains on the LOC measure were significant discriminators between the experimental and the control groups.

Comments: Methods of assignment to groups, research design, and data analysis were appropriate. There was no control for the possible effects of group participation (i.e., control group = no treatment). Mortality (attrition) in the experimental group may have confounded the results.

Table 2--continued

Study	Subjects	Intervention	Dependent Measures
Omizo, Cubberly, & Longano, 1984	66 students with LD, age range 8-11 years	group counseling to eliminate self-defeating feelings and behavior	DOSC; NSLOC Scale

Results: MANOVA results on the pretest measures revealed no significant difference between the experimental and control groups. MANOVA results on the posttest measures indicated a significant difference [$F(6,47) = 8.63$, $p < .01$] between experimental and control groups. Post hoc univariate F's and discriminant analysis procedures revealed that two domains of the self-concept measure and the LOC measure proved to be significant discriminators between the groups.

Comments: Methods of assignment to groups, research design, and data analysis were appropriate. There was no control for the possible effects of group participation (i.e., control group = no treatment). Mortality (attrition) in the experimental group may have confounded the results.

Study	Subjects	Intervention	Dependent Measures
Omizo, Cubberly, & Omizo, 1985	60 students with LD, age range 8-11 years, IQ = 90+	Rational Emotive Education (REE) (Knaus, 1977)	DOSC; NSLOC Scale

Results: MANOVA on the pretest measures revealed no significant difference between experimental and control groups. MANOVA on posttest measures yielded a significant difference [$F(6,49) = 7.44$, $p < .05$] between the groups. Post hoc univariate F's and discriminant analysis revealed that three domains on the self-concept measure and the LOC measure were a significant discriminators between the groups.

Comments: Methods of assignment to groups, research design, and data analysis were appropriate. Implementation of procedures designed to control for the effects of group participation improve confidence in the results. However, mortality (attrition) in the experimental group may have confounded the results.

Study	Subjects	Intervention	Dependent Measures
Omizo, Lo, & Williams, 1986	60 students with LD age range 14-18 years grades 9-12	REE	DOSC; Rotter (I-E) Scale (Rotter, 1966)

Table 2--continued

Results: MANOVA results on the pretest measures revealed no significant difference between the groups. MANOVA results on the posttest measures revealed a significant difference [$F(6,43) = 8.92$, $p < .001$] between experimental and control groups. Post hoc univariate F values and discriminant analysis procedures revealed that three measures of the self-concept measure and the LOC measure were valid discriminators between experimental and control groups.

Comments: Methods of assignment, research design, and data analysis were appropriate. Implementation of procedures to control for possible effects of group participation improved confidence in the results of the study. Mortality (attrition) in both the experimental and control groups ($n = 7$, $n = 3$ respectively) may have confounded the results.

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reported in one study (Omizo, Lo, & Williams, 1986). Omizo, Lo, and Williams used students in grades nine through twelve. Their IQ scores were reported in one study (Omizo, Cubberly, & Omizo, 1985). Omizo, Cubberly, and Omizo reported that IQ scores for their subjects ranged from "90 and above."

Students' age range was reported in all reviewed studies. Students' sex was reported in four of the five studies. Students in the Omizo and Cubberly (1983) study consisted of 48 males and 12 females with an age range of 12 to 14 years ($M = 12.7$). Students in the Omizo and Omizo (1987) study consisted of 52 males and 8 females with an age range of 12 to 15 years ($M = 12.9$). Students in the Omizo, Cubberly, and Longano (1984) study consisted of 47 males and 19 females with an age range of 8 to 11 years ($M = 9.7$). Students in the Omizo, Cubberly, and Omizo (1985) study consisted of 48 males and 12 females with an age range of 8 to 11 years ($M = 9.6$). Students in the Omizo, Lo, and

Williams (1986) study consisted of 60 adolescents with an age range of 14 to 18 years.

Information on socioeconomic status was presented in all reviewed studies. The students were predominantly white and from low to upper middle class backgrounds. Finally, the authors of the reviewed studies reported that all students were certified as "learning disabled" according to the guidelines set forth by the Texas Education Agency.

Measurement Methods

All studies included in this review used pretest and posttest measures to establish research control and increase confidence in reported results. The purpose of the selected pretest and posttest measures, in all reviewed studies, was to assess the effects of an intervention on locus of control and self-concept among students with LD. Since significant correlations have been found between some self-concept measures and some LOC measures (Cooley & Ayres, 1988), a measure of self-concept was included in the reviewed studies.

The types of pretest and posttest measures varied among the studies. The Dimensions of Self-Concept (DOSC) (Michael & Smith, 1977) was used in four studies (Omizo & Cubberly, 1983; Omizo, Cubberly, & Longano, 1984; Omizo, Cubberly, & Omizo, 1985; Omizo, Lo, & Williams, 1986) to measure noncognitive factors associated with self-concept in the school setting. Omizo and Omizo (1987) used the Coopersmith Self-Esteem Inventory (CSI) (Coopersmith, 1967) to measure self-esteem. In three studies, (Omizo & Cubberly, 1983;

Omizo, Cubberly, & Longano, 1984; Omizo, Cubberly, & Omizo, 1985) LOC was measured by the Nowicki-Strickland Locus of Control (NSLOC) Scale (Nowicki & Strickland, 1973). Omizo and Omizo (1987) used the Locus of Control Inventory for Three Achievement Domains (LOCITAD) (Bradley, Stuck, Coop, & White, 1977) to measure perceived acceptance of responsibility for both success and failure in the domains of intellectual, physical, and social activities. Omizo, Lo, & Williams (1986) used the Rotter Internal-External (I-E) Scale (Rotter, 1966) to measure general LOC orientation.

The investigators in each study provided a complete description of the pretest and posttest measures. The validity and reliability of the instruments used for pre and posttesting was included in four of the studies. Omizo and Omizo (1987) provided validity and reliability information on the self-concept measure (CSI) but only provided validity information on the LOC measure (LOCITAD). The researchers noted that the predictive validity coefficients for the DOSC are low (.23 to .62). Finally, since the focus of the present study is LOC, a complete description of the LOC measures used in the reviewed studies has been provided.

Description of LOC measures in reviewed studies. The Nowicki-Strickland Locus of Control Scale (NSLOC) (Nowicki & Strickland, 1973) was used in three of the reviewed studies. The NSLOC Scale is a paper and pencil instrument consisting of 40 questions that require the respondee to mark either the "yes" or the "no" response. The NSLOC Scale was constructed

on the basis of Rotter's (1966) definition of the internal-external control of reinforcement construct. The test items describe reinforcement situations across interpersonal and motivational areas of affiliation, achievement, and dependency. Thus, the NSLOC Scale assesses locus of control across a variety of general life situations. Low correlations between the NSLOC Scale and other variables such as social desirability are reported (Nowicki & Strickland, 1973).

The NSLOC Scale was administered to 1,017 elementary and high school students to obtain reliability estimates and construct validity information. Since both the NSLOC scale and the Rotter (I-E) Scale (Rotter, 1966) are purported to be global measures of the LOC construct, Nowicki and Strickland (1973) postulated that concurrent validity between the two scales would be high. The correlation between the NSLOC Scale and the Rotter (I-E) Scale was found to be significant ($r = .61$, $p < .01$; $r = .38$, $p < .01$) in two studies. A significant correlation ($r = .51$, $p < .01$) was found between the NSLOC Scale and the Intellectual Achievement Responsibility (IAR) Scale (Crandall, Katovsky, & Crandall, 1965) for seventh graders on the subscore that measures beliefs in internal responsibility for success (I+ score). Unlike the NSLOC Scale, which is a general measure of LOC, the IAR Scale was developed as a specific academic LOC measure (Crandall, Katovsky, & Crandall). Nowicki and Strickland reported that split-half reliability coefficients

on the NSLOC Scale range from .68 (for grades 6, 7, and 8) to .81 (for grade 12). Since the NSLOC scale is additive and the test items are not arranged sequentially according to difficulty and are not comparable, the split-half reliabilities may underestimate the internal-consistency of the scale (Nowicki & Strickland). Nowicki and Strickland report that the test-retest reliability coefficients on the NSLOC Scale range from .66 (for grade 7) to .71 (for grade 10).

The Rotter Internal-External (I-E) Scale (Rotter, 1966), another global measure of LOC, was used in one of the reviewed studies. The Rotter (I-E) Scale is a forced-choice 29 item scale. The individual's score on the Rotter (I-E) Scale is reported and interpreted in relationship to where the score falls on a continuum from high external (23) to low internal (0) (Omizo, Lo, & Williams, 1986). Rotter (1966, 1990) reports that the coefficients of test-retest reliability range from .49 to .83. Split-half reliability coefficients, a measure of internal consistency, range from .65 to .79. Low correlations between the Rotter (I-E) Scale and variables such as intelligence and political affiliation are reported (Rotter, 1966).

Finally, in one of the reviewed studies, LOC was measured by the Locus of Control Inventory for Three Achievement Domains (LOCITAD) (Bradley, Stuck, Coop, & White, 1977). According to Omizo and Omizo (1987), the LOCITAD consists of 47 items that measure perceived acceptance of

responsibility for both success and failure across intellectual, physical, and social domains. The results of the LOCITAD are reported and interpreted as the degree of internality-externality perceived by the individual in each of the three domains. Internal consistency coefficients of the LOCITAD are reported for the Intellectual Domain (.53), the Physical Domain (.52), the Social Domain (.54), and the total test (.75). Omizo and Omizo reported that concurrent validity coefficients for the LOCITAD are in the high .70s.

Experimental Procedures

The treatment conditions in the reviewed studies ranged in length of duration from 6 weeks (Omizo, Lo, & Williams, 1986) to 14 weeks (Omizo, Cubberly, & Omizo 1985). Moreover, the length, number, and type of treatment sessions varied in all of the reviewed studies.

Omizo, Lo, and Williams (1986) reported that the experimental group met for 60 minutes, twice a week, for a total of 12 sessions over a 6-week period. The researchers also reported that the control group met and watched National Geographic films at the same times that the experimental group was involved with the REE lessons. Participants in the study met after school hours for the treatment and control group sessions. Rational-emotive education (REE) (Knaus, 1974) is based on rational-emotive therapy (RET) (Ellis, 1972). The premise of RET is that irrational thinking produces irrational feelings and behavior (Ellis, 1972). Accordingly, the focus of REE (Knaus) is the elimination of

negative self-evaluations. Omizo, Lo, and Williams postulated that the REE program would shift LOC to a more internal orientation and improve the self-concepts among adolescents with LD.

Omizo and Omizo (1987) reported that participants in the experimental group met for 90 minutes, once a week, for 7 consecutive weeks. The treatment consisted of group counseling that emphasized eliminating self-defeating behaviors such as negative self-labeling. For administrative reasons, the experimental group was divided into three smaller groups for the group counseling sessions. Moreover, three school counselors were randomly assigned to the three groups and facilitated the group counseling sessions. The researchers note that the participants in the control group continued in their daily activities throughout the treatment phase.

Omizo, Cubberly, and Longano (1984) reported that participants in the experimental condition met for 60 to 90 minutes, once weekly, for 8 consecutive weeks. For administrative reasons, the researchers noted that the experimental group was divided into three smaller groups for the group counseling sessions. The researchers' description of the group counseling program is similar to the program described in the Omizo and Omizo (1987) study. No information was provided regarding the treatment of the control group and attempts to control for possible group participation effects.

Omizo and Cubberly (1983) reported that participants in the experimental condition met twice weekly for 11 consecutive weeks. Each treatment session was 30 to 45 minutes. Participants in the experimental condition discussed topics such as (a) the meaning of a learning disability, (b) specific problems related to achieving academic success, and (c) ways to overcome barriers to success. The training procedures for the experimental group teachers emphasized the following concepts of Reality Therapy: (a) the elimination of punitive responses when students fail to achieve, (b) the encouragement of the students' attempts at self-evaluation and problem-solving, and (c) the avoidance of reinforcing the students' excuses for failure. No information was provided regarding the treatment of the control group and attempts to control for the possible effects of group participation. After post hoc univariate Fs and discriminant analysis procedures were conducted, the LOC measure did not prove to be a significant discriminator between the experimental group and the control group.

Omizo and Cubberly (1983) delineated two interpretations for the result of nonsignificance on the LOC measure. The researchers suggested that (a) the treatment period may not have been long enough or (b) the teachers may not have been adequately trained in the principles of Reality Therapy. The researchers assert that the teachers did receive sufficient training. However, no information is provided regarding

observed changes in teacher behavior after training in the Reality Therapy program. The researchers concluded that the LOC variable was not significantly affected due to the length of treatment time. Finally, Omizo and Cubberly reported that the posttest scores for the experimental group on the LOC measure, although not statistically significant, were determined to be in the expected direction (i.e., toward an internal LOC orientation). Questions remain regarding the researchers' determination of the adequacy of the training procedures in Reality Therapy principles. Moreover, the inclusion of a measure of fidelity to treatment (i.e., Reality Therapy) is needed to substantiate the adequacy of the application of treatment.

Omizo, Cubberly, and Omizo (1985) reported that the experimental group and the control group met for 60 minutes, twice weekly, for 12 weeks. Treatment consisted of peer group discussion, tutoring, activities, games, and lectures on the principles of Rational-Emotive Therapy (REE). The premise in REE is that irrational thoughts lead to irrational behavior. Thus, the instructional goal in REE is to teach students how to dispute irrational thoughts. The control group listened to short stories, a procedure designed to control for the effects of group participation. Finally, the researchers report that the LOC measure was a significant discriminator between the experimental group and the control group.

Finally, consistent procedures in the administration of the pretest and posttest measures were reported in all of the reviewed studies. One week prior to the first group session in each study, the pretests were administered to all participants. Items on both the self-concept and the LOC measures were read aloud to the participants by school counselors. The same procedures were followed in all reviewed studies for posttest administration. Posttests were administered one week subsequent to the final treatment session.

Results

Guidelines for reporting the minimal amount of information for a clear evaluation of research results have been suggested (Brewer & Sindelar, 1988; Haase, 1974; Woolley & Dawson, 1983). The importance of the power analysis of research in special education has been emphasized (Brewer & Sindelar, 1988). Accordingly, the results of the reviewed studies are summarized (see Table 3) and discussed with respect to the three variables that relate to a power analysis: alpha levels, sample size, and effect size. Since LOC was the focus of the present study, only estimates of the effect sizes of the LOC measures in the reviewed studies have been reported. Linn (1986) noted that for studies comparing experimental and control groups, the effect size (ES) may be defined by

$$ES = \frac{Y_E - Y_C}{S}$$

where Y_E and Y_C are the sample means for the experimental and control groups, respectively, and S is the standard deviation in the control group.

Table 3
Summary of Results of Reviewed Studies

Study	Alpha Level	Sample Size	Estimated Effect Size
Omizo & Cubberly, 1983	<.01	56	.38
Omizo, Cubberly, & Longano, 1984	<.01*	60	.79
Omizo, Cubberly, & Omizo, 1985	<.05*	54	1.04
Omizo, Lo, & Williams, 1986	<.001*	50	1.59
Omizo & Omizo, 1987	<.01*	55	.62

*Indicates statistical significance

Brewer and Sindelar (1988) stressed the importance of a priori considerations in research. For example, a preset alpha level, sample size, and estimated ES allow the researcher to define a priori "what an important true effect might be" (p. 76). A priori planning to determine an adequate sample size is emphasized. However, the

researcher's option to plan the sample size is restricted when availability of subjects is a concern. Availability of subjects has been a major practical concern for educational researchers. Consequently, many researchers in education use a "sample of convenience" and risk having a limited and possibly inadequate sample size.

Given the fixed sample situation, an a priori estimation of the desired effect is recommended (Brewer & Sindelar, 1988). With regard to the size of the desired effect, Woolley and Dawson (1983) stated that "the criteria for practical importance should already be in place at the time of the statistical rejection of the null [hypothesis]" (p. 674). One approach in a priori determination of ES is based on an analysis of effect sizes across similar studies. However, Cook and Campbell (1979) noted the practical difficulties in determining the size of the desired effect. For example, estimates of ES are affected by factors such as (a) sampling error, (b) study differences in range restriction, (c) study differences in the validity and reliability of the independent and dependent measures, and (d) computational, typographical, and transcription errors (Linn, 1986).

Effect sizes across the reviewed studies (see Table 2) ranged from .38 to 1.59. A number of factors may account for the variance in the obtained effect sizes. Although the dependent variable was consistent across the reviewed studies (i.e., LOC), study differences in the validity and

reliability of the measures of the dependent variable have been reported. Study differences in the independent variables also have been reported. Moreover, attrition in the experimental groups in all of the reviewed studies may account for a portion of the posttreatment mean differences in the experimental and control groups. Given the inconsistency in the study characteristics of the reviewed studies, sound conclusions regarding the estimation of ES are lacking.

Summary

The development of metacognition and motivation for students with LD has become a recent goal in special education. The need to increase the motivation of students with LD has led researchers to study specific affective variables such as locus of control. Recent efforts to understand the links between an external locus of control for reinforcement and poor performance on school-related tasks among students with LD have been reported.

Researchers have been encouraged to seek methods to alter an external LOC orientation because of the preponderance of desirable achievement behaviors associated with an internal LOC orientation. Based on a review of the research literature, it can be concluded that student perception of an internal LOC and achievement are highly correlated and that student perception of LOC can be altered.

Research on the effectiveness of using educational interventions to change the LOC orientation of students with

LD is limited. Clearly, further investigation of the effects of training in a comprehensive strategy system on the LOC among students with LD was warranted.

CHAPTER 3
METHODOLOGY

Chapter 3 presents the methods and procedures of the study. The chapter has been divided into 10 sections. The sections include a description of (a) the hypotheses, (b) the subjects and setting, (c) the research instrumentation, (d) the measurement procedures, (e) the reliability of procedures, (f) the training of personnel, (g) the Test-Taking Strategy instructional procedures, (h) the treatment of the control group, (i) the experimental design, and (j) the analysis of the data.

Hypotheses

This study was designed to examine the effects of teaching a test-taking strategy on the locus of control orientation of middle school students with learning disabilities. The following null hypotheses were posited for testing at the .05 level of confidence:

H1: There will be no statistically significant difference between the experimental group and the control group on a global measure of locus of control.

H2: There will be no statistically significant difference between the experimental group and the control group on a specific, academic measure of locus of control.

Subjects and Setting

The participants in this study were students with learning disabilities enrolled in grades 6 though 8 at a middle school, located in a rural area, Marion County, Florida. Eligible students were identified as meeting the criteria for learning disabilities as outlined by the State of Florida. The description of students was based on guidelines recommended by experts in the field of learning disabilities (Rosenberg et al., 1992). Table 3 contains a list of student data that are easily tabulated: gender, age, race, socioeconomic status (SES), grade level, percentage of time in the special education program, IQ, reading, language arts, and mathematics achievement scores and grades. Teachers estimated a student's SES status on a scale of low (1), middle (2), and high (3). A student's eligibility for free or reduced lunch was suggested to the teachers as an indication of low SES status. All achievement scores were based on the most recently administered (May, 1993) California Test of Basic Skills (CTBS) and are considered estimates of mastery levels in reading, language arts, and mathematics. All scores of general ability were based on the most recently administered test of intelligence.

Additionally, eligible students participated in a screening procedure to ensure that they had no prior knowledge regarding the Test-Taking Strategy (Hughes et al., 1988). To be included in the study, students scored less than 70% on the screening instrument. Students who qualified

for inclusion in the study (N = 44) were randomly assigned to experimental and control groups. Once students were assigned to conditions, pretests for both measures of locus of control were administered. Equivalence of groups was checked on the key variables noted above and as summarized in Table 4.

All training sessions took place in rooms that were adequately lit and equipped with tables and chairs for students, a teacher desk, and a blackboard. One of the rooms was adjacent to the library and also served as a conference room. The second room was adjacent to one of the sixth grade classrooms and also served as a conference room for teachers. The third room was adjacent to the shop classroom, but was not used for any other purpose during the length of the study.

Research Instrumentation

The research instruments that were used in this study are two measures of the locus of control variable. One instrument, the Nowicki-Strickland Locus of Control (NSLOC) Scale (Nowicki & Strickland, 1973) was designed as a general measure of locus of control for reinforcement. The second instrument, the Individual Achievement Responsibility (IAR) Scale (Crandall, Katovsky, & Crandall, 1965) was designed as a specific measure of academic locus of control.

Nowicki-Strickland Locus of Control Scale

The NSLOC Scale is a paper and pencil instrument consisting of 40 questions that requires the student to mark either the "yes" or the "no" response. The authors of the

Table 4
Description of Students

Experimental Group	Comparison Group
Numbers: Male = 11 Female = 9 Total = 20	Numbers: Male = 15 Female = 5 Total = 20
Age: Mean = 13-0 years Range = 12-0 to 15-10	Age: Mean = 13-2 years Range = 11-9 to 14-10
Race/Ethnicity: (reported as numbers) Anglo = 11 Hispanic = -- African American = 9	Race/Ethnicity: (reported as numbers) Anglo = 10 Hispanic = 1 African American = 9
SES: (reported as numbers) High = -- Middle = 14 Low = 6	SES: (reported as numbers) High = 1 Middle = 14 Low = 5
Grade Level: (reported as numbers) Grade 6 = 14 Grade 7 = 5 Grade 8 = 1	Grade Level: (reported as numbers) Grade 6 = 14 Grade 7 = 4 Grade 8 = 2
Percentage of Time in Special Ed. Program (from current IEP): (reported as numbers of students by category of time) 10-20% = 7 21-36% = 8 37-51% = 4 52-66% = 1	Percentage of Time in Special Ed. Program (from current IEP): (reported as numbers of students by category of time) 10-20% = 8 21-36% = 9 37-51% = 3 52-66% = --
Intelligence: Mean = Full Scale IQ-94 Range = 77-118 Test Used = WISC-R	Intelligence: Mean = Full Scale IQ-96 Range = 80-137 Test Used = WISC-R
Achievement Scores: (reported as percentiles) Mean Reading = 11th %ile Mean Lang. Arts = 14th %ile Mean Mathematics = 14th %ile Test Used = CTBS	Achievement Scores: (reported as percentiles) Mean Reading = 22nd %ile Mean Lang. Arts = 15th %ile Mean Mathematics = 14th %ile Test Used = CTBS

Table 4--continued

Experimental Group	Comparison Group
Reading Grades: (reported as numbers of students obtaining these grades) A = 2 B = 10 C = 7 D = 1 F = --	Reading Grades: (reported as numbers of students obtaining these grades) A = -- B = 14 C = 5 D = 1 F = --
Language Arts Grades: (reported as numbers of students obtaining these grades) A = 1 B = 11 C = 6 D = 1 F = 1	Language Arts Grades: (reported as numbers of students obtaining these grades) A = -- B = 11 C = 9 D = -- F = --
Mathematics Grades: (reported as numbers of students obtaining these grades) A = -- B = 12 C = 7 D = 1 F --	Mathematics Grades: (reported as numbers of students obtaining these grades) A = 1 B = 11 C = 4 D = 3 F = 1

test have noted that the test items can be read aloud to individuals, especially when the student's ability to read is a concern. The procedure of reading aloud test items during administration of the NSLOC Scale was employed in three of the studies reviewed in Chapter 2.

The NSLOC Scale was constructed on the basis of Rotter's (1966) definition of the internal-external control of reinforcement construct. The test items describe reinforcement situations across interpersonal and

motivational areas of affiliation, achievement, and dependency. Thus, the NSLOC Scale assesses locus of control across a variety of general life situations. Low correlations between the NSLOC Scale and other variables such as social desirability are reported (Nowicki & Strickland, 1973).

The NSLOC Scale was administered to 1,017 elementary and high school students to obtain reliability estimates and construct validity information. Since both the NSLOC scale and the Rotter (I-E) Scale (Rotter, 1966) are purported to be global measures of the LOC construct, Nowicki and Strickland (1973) postulated that concurrent validity between the two scales would be high. The correlation between the NSLOC Scale and the Rotter (I-E) Scale was found to be significant ($r = .61$, $p < .01$; $r = .38$, $p < .01$) in two studies. A significant correlation ($r = .51$, $p < .01$) was found between the NSLOC Scale and the Intellectual Achievement Responsibility (IAR) Scale (Crandall, Katovsky, & Crandall, 1965) for seventh graders on the subscore that measures beliefs in internal responsibility for success (I+ score). Unlike the NSLOC Scale, which is a general measure of LOC, the IAR Scale was developed as a specific academic LOC measure (Crandall, Katovsky, & Crandall, 1965). Nowicki and Strickland reported that split-half reliability coefficients on the NSLOC Scale range from .68 (for grades 6, 7, and 8) to .81 (for grade 12). Since the NSLOC scale is additive and the test items are (a) not arranged sequentially according to

difficulty and (b) not comparable, the split-half reliabilities may underestimate the internal-consistency of the scale (Nowicki & Strickland, 1965). Nowicki and Strickland reported that the test-retest reliability coefficients on the NSLOC Scale range from .66 (for grade 7) to .71 (for grade 10).

Individual Achievement Responsibility Scale

The Individual Achievement Responsibility (IAR) Scale (Crandall et al., 1965) is a widely used measure of academic locus of control. Specifically, the IAR Scale measures perceived control and reinforcement responsibility specifically related to academic achievement situations. The instrument consists of 34 forced-choice items. The IAR yields a total responsibility (I_{total}) score and two subscale scores. One half of the items describe a successful achievement experience and the other half describe a failure experience. The items are followed by two alternative responses: one attributes an internal locus of control (I+ subscale), the other an external locus of control (I- subscale).

The IAR Scale was administered to 923 elementary and high school students from five different types of communities. Test-retest coefficients for I_{total} = .69; .66 for I+ subscale, and .74 for I- subscale. All test-retest correlation coefficients were reported to be significant at the .001 level.

Split-half reliabilities were computed separately to determine the internal consistency of the two subscales. Crandall et al. (1965) report that for a random sample of 130 "younger" children the correlation is .54 for the I+ subscale and .57 for I- subscale. The authors report that for a random sample of 130 "older" children the correlations are .60 for both subscales.

The IAR Scale was correlated with two measures of academic achievement, the Iowa Tests of Basic Skills (ITBS) and report card grades. Crandall et al. (1965) report that I_{total} scores correlated positively and significantly with total achievement test scores and with report card grades for grades 3, 4, and 5. However, the actual correlations were not reported.

According to Stipek and Weisz (1981), the IAR Scale has been the most widely used instrument in locus of control studies. In a review of locus of control instruments, MacDonald (1973) notes that the IAR Scale "is a carefully developed scale that shows acceptable reliability and evidence of both divergent and convergent validity" (p. 195).

Criterion Measure Related to the Dependent Variable

A criterion measure related to the dependent variable was employed in the present study. It has been postulated that when an individual expects to control something, the individual expects success (Gregory, 1981). The notion that individuals with an internal locus of control have a high degree of success expectancy when faced with novel tasks

(Singer, 1978), supported the use of a criterion measure on the locus of control variable in the present study. According to Gregory, one way to assess whether students expect to succeed owing to an internal or external orientation, is to assess immediate expectancies for success. Student expectancies for success or failure were assessed by asking students to make predictions regarding scores on future tests. Specifically, once feedback had been given to the student regarding performance on either a controlled practice test or a grade-appropriate test, the student was asked the question, "What score do you expect to get on your next test?" The actual score that the student expected to obtain was recorded by the graduate student and then coded as higher, lower, or no change. Data on the criterion measure were collected throughout the strategy training stages that included opportunities for students in the experimental group to take practice tests. Data on the criterion measure also were collected in the comparison group setting on three separate occasions.

Measurement Procedures

Several measurement procedures were used during the study. The procedures included (a) scoring the pretest in the Test-Taking Strategy for placement in the study, (b) scoring the practice tests and posttest in the Test-Taking Strategy, and (c) scoring the pretests and posttests on the locus of control variable.

Scoring the Pretest for Placement in the Study

Screening for participation in the study was completed using the pretest component in the Test-Taking Strategy Instructor's Manual. The purpose of the pretest is to determine what kinds of strategies are used when the students take a test. To be included in the study, students scored less than 70% on the pretest.

Practice Tests and Posttests in the Strategy

Controlled practice tests are designed so that students can practice applying the steps of the Test-Taking Strategy on classroom-type tests. Student responses were scored within three categories: general responses, responses to instructions, and responses to test items. Controlled practice tests and answer keys were included in the Test-Taking Strategy Instructor's Manual. Controlled practice tests were administered to experimental students until a score of 90% or more was obtained.

Grade-appropriate practice tests are designed so that students can practice applying the steps of the strategy on tests constructed by the strategy trainers using materials from the students' classrooms. Grade-appropriate tests were administered to experimental students until a score of 85% or more was obtained. Guidelines for the construction and evaluation of grade-appropriate tests were included in the Test-Taking Strategy Instructor's Manual.

The posttest is used to obtain a measure of the student's progress in learning the strategy. The materials

and procedures for the posttest component were included in the Test-Taking Strategy Instructor's Manual. The criterion for mastery on the posttest was set at 90%.

Scoring the Pretests and Posttests on the LOC Variable

The pretest and posttest measures on the LOC variable were conducted as follows. After initial screening for inclusion in the study, all eligible students were randomly assigned to experimental and control groups. Next, the Nowicki-Strickland Locus of Control (NSLOC) Scale (Nowicki & Strickland, 1973) and the Individual Achievement Responsibility (IAR) Scale (Crandall et al., 1965) were administered to all students participating in the study. Both measures were read aloud to all students participating in the study. Procedures for scoring the NSLOC were provided by Nowicki and Strickland (1973). Procedures for scoring the IAR Scale were provided by Crandall et al. (1965). Posttests with the same instruments were administered to all students participating in the study, after students in the experimental group obtained a score of 90% or more on the Test-Taking Strategy posttest.

Reliability of Procedures

Several procedures were used during the study to establish the reliability of measurement and instructional procedures. Interscorer agreement and procedural reliability checks were implemented to obtain reliability information.

Interscorer Agreement

To establish interscorer agreement, all of the pretests and posttests for both the strategy intervention and the LOC variable were scored by at least two independent scorers using the same scoring procedures. Interscorer agreement was calculated by the following formula recommended by Tawney and Gast (1981):

$$\frac{\text{Agreements}}{\text{Agreements + Disagreements}} \times 100 = \text{Percent of Agreement}$$

The principal investigator served as a third scorer for reliability purposes only.

Procedural Reliability

Strategy instruction was conducted by two graduate students and the principal investigator who were previously trained in the Test-Taking Strategy. The graduate students were randomly assigned to experimental and control groups in the first period class and then counterbalanced in the second period class to control for possible teacher effect. The random assignment to groups took place once at the beginning of the study. Consequently, each graduate student instructed an experimental group and a control group each day for 45 to 60 minutes, over 13 sessions, the length of the present study.

To ensure procedural reliability, three independent observers, previously trained in the Test-Taking Strategy, observed 19 instructional sessions in the experimental setting. The observers ascertained whether the strategy

instruction for the experimental group was consistent with the procedures as outlined in the Test-Taking Strategy Instructor's Manual.

Mean interrater agreement was reported for fidelity of treatment using the following formula:

$$\frac{\text{Agreements}}{\text{Agreements + Disagreements}} \times 100 = \text{Percent of Agreement}$$

The accuracy with which strategy trainers implemented the strategy was assessed. In order to obtain a measure of procedural compliance, relevant instructional behaviors were observed and recorded.

The observers used an observation form to record teacher behaviors in the areas of (a) following the content of the script, (b) following the sequence of instructional procedures, and (c) using the instructional materials appropriately. Observers used headphones to listen to a cassette tape designed to beep at 30-second intervals. Each time the beep was heard, the observer recorded whether a specific instructional behavior was observed.

Training of Personnel

Prior to the beginning of the present study, two graduate students were trained in the Test-Taking Strategy and successfully implemented the strategy with middle school students. The independent observers were trained prior to the present study to provide procedural reliability checks. Since the two observers had been trained in the KU-IRLD strategies, they did not require training in the Test-Taking

Strategy procedures. Scoring methods for both of the LOC measures as discussed in this chapter, were demonstrated to the independent scorers. Criteria for decisions and scoring methods were practiced. The principal investigator provided the training and was available for any questions regarding the scoring procedures during the scoring process.

The Test-Taking Strategy Instructional Procedures

The Test-Taking Strategy (Hughes et al., 1988) was developed as a comprehensive strategy system to improve the test-taking skills of adolescents with learning disabilities. During training, students develop an awareness of different test formats and learn the strategies that can help improve their performance on tests. Moreover, students learn that setting goals for learning is important. A cognitive strategy that has been shown to improve students' test-taking skills, as well as promote a sense of student control over educational outcomes (Hughes et al., 1988), was selected as an appropriate intervention for students with LD in the present study.

Strategy Steps

A mnemonic helped the students remember the steps of the strategy. The first letter of the first word in each step of the strategy corresponds to a letter in the mnemonic, PIRATES. The steps of the strategy were verbally rehearsed until the students recited them accurately from memory. The strategy steps are:

1. P Prepare to succeed.
2. I Inspect the instructions.
3. R Read, remember, reduce.
4. A Answer or abandon.
5. T Turn back.
6. E Estimate.
7. S Survey.

In the first step, prepare-to-succeed, students remember to write their names and the mnemonic "PIRATES" on the test. Writing the mnemonic on the test helps the students remember to use each of the steps in the strategy system. Next, students say a positive affirmation to themselves (e.g., "I will be successful on this test because I can use the test-taking strategy.") to calm themselves and affirm their sense of control over the testing situation. Then students allot time for each of the sections of the test, based on the number of sections and allotted time for the test. Next, students determine the order in which they will complete the sections of the test by considering the difficulty level of each section. Finally, students begin the test within 2 minutes.

In the second step, inspect-the-instructions, students read the instruction and underline how and where to respond. Specifically, students learn how to attend to the specific directions, i.e., underline, circle, or write "true" or "false" for each section of the test.

In the third step, read-remember-reduce, students read the test item, remember what they have studied, and reduce their choices by eliminating absurd or similar choices. Specifically, students learn how to reduce choices in multiple formats by crossing out obviously incorrect choices.

In the fourth step, answer-or-abandon, students either answer or abandon a test item. Specifically, students are taught to mark abandoned items with a symbol that will cue them later to answer the abandoned item.

In the fifth step, turn-back, students go back to the beginning of the test and answer previously abandoned items. The sixth step, estimate, is employed by the student as a substrategy of guessing techniques such as, avoiding absolute words, choosing the longest or most detailed answer, or eliminating similar choices. Finally, in the last step of the strategy system, survey, students look over the test to make certain they have answered all items.

Student Materials

The material that the experimental students used during the strategy instruction were included in the Test-Taking Strategy Instructor's Manual. The materials assisted the student in learning the Test-Taking Strategy.

Instructional Materials

The strategy trainers used scripted lessons to ensure consistency of instructional content for all experimental students. In addition to the scripted lessons, the strategy trainers used effective instruction techniques such as rapid

pacing, actively involving students through questioning, positive reinforcement, and immediate, corrective feedback. The strategy trainers used materials included in the Test-Taking Strategy Instructor's Manual to assist in the delivery of strategy instruction.

Treatment of Control Group

A no-treatment control group was not used in this study, since the students with learning disabilities who participated in this study were receiving some type of special education instruction, it would have been inappropriate to deny services to students with disabilities needing assistance. Comparison group students received instruction from the assigned graduate student in study skills. Student materials consisted of the textbooks and workbooks typically used in the students' classrooms. For example, the assigned graduate student instructed comparison group students in the study skill areas of skimming and notetaking. To ensure that the Test-Taking Strategy procedures were not implemented in the control group setting, three doctoral students observed 10 comparison group sessions. Procedural reliability and training of personnel procedures for the control group sessions were implemented as discussed earlier in this chapter.

Experimental Design

The design of the present study was a randomized pretest-posttest control group design (Cook & Campbell, 1979). With random assignment, any differences obtained

between the groups on the dependent variable can be attributed more confidently to the independent variable. The pretest-posttest control group design is more sophisticated than the posttest-only control group design because it can assess changes in the dependent variable over time. After initial screening with the strategy pretest, all students were randomly assigned to experimental and control groups using a table of random numbers. After random assignment to groups, all students were pretested with both measures of the LOC variable. The number and length of sessions were the same throughout the study for both the experimental and comparison groups. Prior to the first session of training, personnel were randomly assigned to experimental and comparison groups with the flip of a coin. After the participants in the experimental group obtained the criterion established for mastery on the strategy posttest (90%), all students were posttested with both measures of the LOC variable.

Analysis of the Data

A repeated measures analysis of variance (ANOVA) was computed to determine whether any significant differences existed between the experimental and comparison groups on the dependent measures. Table 5 depicts a general data matrix for the analysis in the present study. The data matrix is a mixture of the one-factor completely randomized and the one-factor repeated measurements designs. The dependent measures were the pretest and posttest scores obtained on the NSLOC

Scale and the IAR Scale. Significance at .05 level was established for rejection of the null hypothesis.

Summary

In this chapter, a complete description of subjects, measures, procedures, experimental design, and data analysis for this study have been presented. The subjects were middle school students with learning disabilities attending school in Ocala, Florida. The design of the present study was a randomized pretest-posttest control group design. An ANOVA was computed to determine whether significant differences existed between the experimental and comparison groups.

Table 5
Data Matrix

		Variable B			
Variable 1	Students	B_1 (Pretest)	B_2 (Pretest)	B_3 (Posttest)	B_4 (Posttest)
(Experimental)	01	X_{011}	X_{012}	X_{013}	X_{014}
Group 1	02	X_{021}	X_{022}	X_{023}	X_{024}
	•				
	•				
	•				
	20	X_{201}	X_{202}	X_{203}	X_{204}
(Comparison)	21	X_{211}	X_{212}	X_{213}	X_{214}
Group 2	22	X_{221}	X_{222}	X_{223}	X_{224}
	•				
	•				
	•				
	40	X_{401}	X_{402}	X_{403}	X_{404}

Note: Variable B_1 = Nowicki-Strickland Locus of Control (NSLOC) Scale - pretest
Variable B_2 = Individual Achievement Responsibility (IAR) Scale - pretest
Variable B_3 = Nowicki-Strickland Locus of Control (NSLOC) Scale - posttest
Variable B_4 = Individual Achievement Responsibility (IAR) Scale - posttest

CHAPTER 4
RESULTS

The purpose of this study was to investigate the effects of a complex test-taking strategy on locus of control for middle school students with learning disabilities. To this end, two hypotheses were formulated and tested. This chapter contains the results of the statistical analyses of data obtained in this investigation. First, the reliability of measurement and instructional procedures is reported. Second, the statistical model is described and the analyses of the data are presented. Third, the related findings are presented. Finally, the results relevant to the social validation measures are provided.

Reliability of Measurement and Instructional Procedures

Several procedures were used during the study to establish the reliability of measurement and instructional procedures. Interscorer agreement and procedural reliability checks were implemented to obtain reliability information.

Interscorer Agreement

To establish interscorer agreement, all of the pretests and posttests for both the strategy intervention and the LOC variable were scored by two independent scorers using the same scoring procedures. The principal investigator served as a third scorer for reliability purposes only. Interscorer

agreement was calcuated by the following formula recommended by Tawney and Gast (1984):

$$\frac{\text{Agreements}}{\text{Agreements + Disagreements}} \times 100 = \text{Percent of Agreement}$$

Interscorer agreement for all pretests and posttests for the strategy intervention was 100 percent. Interscorer agreement for all pretests and posttest for the LOC variable was 100 percent.

Procedural Reliability

To ensure procedural reliability, three independent observers, previously trained in the Test-Taking Strategy observed 19 instructional sessions in the experimental setting and 10 instructional sessions in the control setting. The observers used an observation form (see Appendix E) to ascertain whether the strategy instruction in the experimental condition was consistent with the procedures as outlined in the Test-Taking Strategy Instructor's Manual. Fidelity of treatment was assessed by counting the number of 30-second intervals (point observations) in which specific teacher behaviors were observed and dividing the total number of 30-second intervals for each 10-minute observation.

In the experimental condition, the overall procedual compliance for the three strategy trainers was .98 with a range of .90 to 1.00. These results indicate that across all 19 observations in the experimental condition, relevant Test-Taking Strategy instructional behaviors were observed 98 percent of the time.

To ensure that the Test-Taking Strategy procedures were not implemented in the control setting, three independent observers observed the two trainers in the control condition for a total of 10 instructional sessions. Across all 10 observations in the control condition, relevant Test-Taking Strategy instructional behaviors were not observed.

Statistical Analysis of the Data

The organization of this section addresses each of the following points: (a) summary statistics, (b) analysis model, and (c) inferential statistics. The means and standard deviations of the pretest and posttest scores on the two dependent measures are reported by group in Table 6.

Table 6
Means and Standard Deviations for Each Dependent Measure by Group

Group	Dependent Measure	Pretest	Posttest
Experimental	NSLOC Scale	24.10 (3.66)	25.00 (5.211)
	IAR Scale	20.90 (4.64)	24.45 (4.27)
Control	NSLOC Scale	24.15 (2.47)	26.30 (2.57)
	IAR Scale	23.20 (3.54)	24.25 (4.64)

The statistical analysis model for the present study is a mixture of the one-factor completely randomized and the one-factor repeated measurements designs (Kennedy & Bush, 1985). Essentially, the simple structure of the one-factor

repeated measurements design has been utilized. From this perspective, there are two levels of Time and a Group x Time interaction. An ANOVA was used to test the null hypothesis of no effect of the independent variable (the Test-Taking Strategy) on two measures of locus of control. In Table 7 and Table 8 the results of these analyses are summarized.

Table 7
Repeated Measures Analysis of Variance for the NSLOC Measure

Source	df	F Value	p
Group	1	.49	.488
Error	38		
Time	1	5.75	.02*
Time x Group	1	0.97	.331
Error	38		

*Significant at the p <.05 level.

Table 8
Repeated Measures Analysis of Variance for the IAR Scale Measure

Source	df	F value	p
Group	1	.84	.364
Error	38		
Time	1	9.81	.003*
Time x Group	1	2.90	.096
Error	38		

*Significant at the p. <.05 level.

Inspection of Table 7 indicates that no significant group (treatment) over time interaction effect was found [$F(1,38) = .97$, $p > .05$]. A significant main effect for time was found [$F(1,38) = 5.75$, $p < .05$]. In other words, significant main effects are observed within students on the pretest to posttest NSLOC measure. The students, regardless of whether they received the intervention, scored higher on the posttest than on the pretest. Inspection of Table 8 indicates no significant group (treatment) over time interaction was found [$F(1,38) = 2.90$, $p > .05$]. A significant main effect (within subjects for time was found [$F(1,38) = 9.81$, $p < .05$]. In other words, the students, regardless of whether they received the intervention, scored higher on the posttest than on the pretest. An analysis of these results indicates no significant differences between groups on either measure of the locus of control variable resulting in a failure to reject the null hypotheses.

Related Findings

Further analysis included the calculation of Pearson Correlation Coefficients to examine the relationship between specific variables (e.g., Verbal IQ scores, Performance IQ scores, and Full Scale IQ scores) and the posttest scores on the two locus of control measures. Additionally, the students' obtained scores versus predicted scores on the criterion measure (expectancy of success) were plotted and visually analyzed. These results are summarized in the following section.

Correlation Analysis on Specific Variables

A correlation analysis for the experimental group (see Figure 4) yielded a strong positive relationship (.745 at the p .002 level) between Verbal IQ scores and NSLOC posttest scores. No significant relationship emerged between Performance IQ scores and NSLOC posttest scores. A moderate positive relationship (.587 at the p .006 level) was found between Full Scale IQ scores and NSLOC posttest scores. Higher Verbal IQ scores and higher Full Scale IQ scores were found to be significantly correlated with higher posttest scores (i.e., more internal orientation) on the NSLOC measure for the experiemental group. In contrast, a correlation analysis for the control group yielded no significant relationships between Verbal IQ, Performance IQ, or Full Scale IQ scores and posttest scores on either of the two measures of locus of control (see Figure 5).

Analysis of Obtained Versus Predicted Scores

Student expectancies for success or failure were assessed by asking students to make predictions regarding scores on future tests. Students in both groups had the opportunity to take the same (controlled) practice tests. Students in the experimental group were given their obtained test scores and elaborate feedback on their performance relating to their use of the Test-Taking Strategy before they were asked to make predictions about future tests scores. Students in the comparison group were given their obtained test scores and no feedback on their performance before they

	VIQ	PIQ	FSIQ	NS-POST	IAR-POST
VIQ	1.0	.61686* (.0038)	.90670 (.1604)	.74577* (.0002)	.13790 (.5621)
PIQ		1.0	.88873* (.0001)	.27681 (.2374)	.05180 (.8283)
FSIQ			1.0	.58719* (.0065)	.08993 (.7061)
NS-POST				1.0	.6618 (.7816)
IAR-POST					1.0

*Signifiant at p = .05

Figure 4. Intercorrelation matrix for experimental group.

	VIQ	PIQ	FSIQ	NS-POST	IAR-POST
VIQ	1.0	.56159* (.0100)	.90496* (.0001)	-.15847 (.5046)	-.11126 (.6405)
PIQ		1.0	.85932* (.0001)	-.13015 (.5845)	-.18192 (.4427)
FSIQ			1.0	-.17444 (.4620)	-.16410 (.4894)
NS-POST				1.0	.25726 (.2735)
IAR-POST					1.0

*Significant at p = .05.

Figure 5. Intercorrelation matrix for comparison group.

were asked to make predictions about future test scores. Data on the criterion measure were collected over three occasions for both groups. The data were plotted and visually inspected for linear relationships between obtained and predicted scores for each occasion by group. A visual inspection of the scatter plots for the experimental group indicated a linear relationship between obtained and predicted scores with a slope that increases for each successive test occasion. No linear relationship was evident in the scatter plots for the comparison group. To illustrate these results, the means for the obtained and predicted scores for both groups (see Table 9) over three successive occasions are represented in Figure 6.

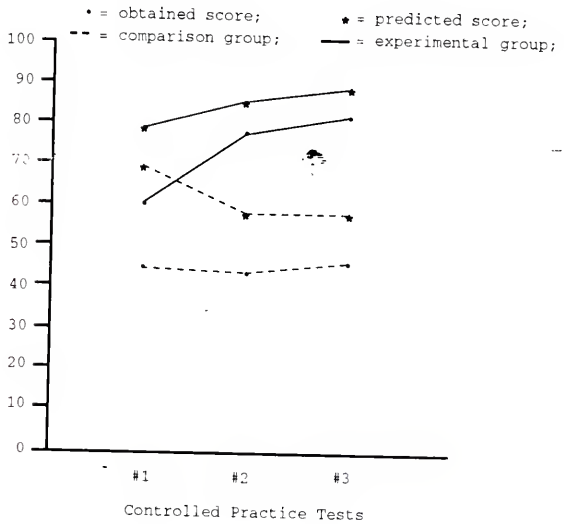

Figure 6. Means of obtained and predicted scores for experimental group and comparison group.

Figure 6 illustrates that for each successive test occasion, the experimental group, on the average, predicted higher scores than their previously obtained scores. The average predicted score for the experimental group increased over each successive test occasion. The comparison group, on the average, predicted higher scores than their previously obtained scores; however, the predicted scores decreased over each successive test occasion.

Table 9
Means and Standard Deviations of Obtained and Predicted Scores by Group

	Experimental Group		Comparison Group	
	Obtained	Predicted	Obtained	Predicted
Practice Test #1	59.55 (9.45)	79.00 (11.36	45.45 (3.87)	68.15 (17.07)
Practice Test #2	77.05 (9.16)	85.85 (8.71)	45.10 (4.19)	59.15 (17.51)
Practice Test #3	84.40 (9.33)	90.70 (8.14)	46.45 (4.85)	57.35 (15.48)

Social Validation Measures

At the conclusion of the present study, students in the experimental group (N = 20) and their special education teachers (N = 4) expressed their opinions about the importance, effectiveness, and the practicality of the Test-Taking Strategy. The importance of the Test-Taking Strategy was assessed by asking the teachers to rate the importance of test-taking skills in the grades students obtain on classroom tests. Questions about improvements in the students' test-

taking skills were used to evaluate perceptions of the effectiveness of the strategy intervention. Indicators of the practicality of the strategy were the students and teachers expressed (a) intent to use or teach the Test-Taking Strategy themselves and (b) recommendations that other students learn the Test-Taking Strategy. Satisfaction questionnaires were completed by all students in the experimental group (see Appendix F). Teacher satisfaction questionnaires (see Appendix G) were completed by the students' special education teachers. A summary of the responses to the student satisfaction questionnaire is presented in Table 10.

Table 10
Summary of Student (N = 20) Satisfaction Responses

Question Content	Response DN	SP/N	DP
Strategy Effectiveness (improved test-taking skills)			
Overall improvement		2	18
In at least one class		10	10
Recognized by teachers	1	9	10
Recognized by family	4	11	5
Practicality of the Strategy			
Could use to improve grades		5	15
Would recommend to others		7	13

Note: DP = Definitely positive response
SP/N = Somewhat positive or neutral response
DN = Definitely negative response

Student Satisfaction

The students' perceptions of the effectiveness of the PIRATES strategy were positive. Eighteen students thought that their test-taking skills definitely improved, and two students thought that their skills improved somewhat. One-half of the students thought that their test-taking skills definitely improved in at least one of their classes and one-half thought their test-taking skills improved somewhat in at least one of their classes. Overall, the students' views with respect to their perceptions of teachers' recognition of test-taking improvement were positive. One-half of the students thought that their teachers definitely noticed an improvement in their test-taking skills. Nine students thought that their teachers may have noticed an improvement. One student thought that his teachers definitely had not noticed an improvement.

With respect to family recognition of improved test-taking skills, students' responses were variable. Four students thought that their families definitely had not noticed an improvement. Five students thought that their families definitely had noticed an improvement. Eleven students thought that their families may have noticed an improvement.

Finally, student satisfaction with regard to the pracicality of the PIRATES strategy was positive. Seven students thought that they might recommend the strategy to other students. Thirteen students thought they definitely

would recommend that other students learn the PIRATES strategy.

Teacher Satisfaction

A summary of the responses to the teacher satisfaction questionnaire is presented in Table 11. It should be noted that prior to the presentation of the teacher satisfaction questionnaires, the principal investigator met briefly with the special education teachers to discuss with them the procedures utilized in the study, including the assignment of their students to groups.

Table 11
Summary of Teacher (N = 4) Satisfaction Responses

	Response		
Question Content	DN	SP/N	DP
Importance of Test-Taking Skills			4
Strategy Effectiveness (students' improved test-taking skills)			
Noticed in at least one class		1	1 **
Thought PIRATES was helpful		1	1 **
Practicality of the PIRATES strategy			
Recommend other students learn			4
Would like to teach PIRATES		1	3

** Two teachers commented: "No opportunity to observe."

Note: DP: Definitely positive response
SP/N: Somewhat positive or neutral response
DN: Definitely negative response

All four of the teachers verified the importance of test-taking skills in students' grades on classroom tests. Improvement in students' test taking skills was noticed somewhat by one teacher. One teacher definitely noticed an improvement. Two teachers commented that they had no opportunity to observe an improvement during the intervention period.

Two teachers responded that the PIRATES strategy definitely was helpful in improving the students' test-taking skills. Once again, two teachers commented that they had no opportunity to observe an improvement during the intervention period.

All of the teachers responsed that they definitely would recommend that other students learn the PIRATES strategy. Three of the teachers responded that they definitely would like to teach the PIRATES strategy. One teacher indicated that he might like to teach the strategy.

Summary

The purpose of the present study was to investigate the effects of a complex cognitive strategy, the Test-Taking Strategy, on the locus of control of middle school students with learning disabilities. Also of interest were the subjects' and their teachers perceptions of the importance, effectiveness, and practicality of the strategy. Interscorer agreement was 1.00. Overall fidelity to treatment in the experimental condition was .98. An ANOVA was used to accept or reject the null hypothesis of no change in locus of

control. No significant differences between the experimental and comparison groups were found resulting in a failure to reject the null hypotheses. Correlation coefficients for the experimental group yielded (a) a strong positive relationship (.75) between Verbal IQ scores and the NSLOC posttest scores and (b) a moderate positive relationship (.59) between the Full Scale IQ scores and the NSLOC posttest scores. On the average, predicted scores increased over successive trials. In contrast, the comparison group's average predicted scores decreased over successive trials. Finally, ratings of students in the experimental group and their special education teachers indicated satisfaction with the test-taking strategy system.

CHAPTER 5
DISCUSSION

The findings and implications for the investigation of the effects of a complex cognitive strategy on the locus of control orientation of middle school students with learning disabilities are presented in this chapter. The chapter has been divided into five major sections. First, a review of the purpose, literature, and methodology is presented. Second, a summary and analysis of results and related findings are provided. Third, the theoretical implications of the research findings are presented. Fourth, limitations to the present study are discussed. Finally, suggestions for future research are provided.

Review of Purpose, Literature, and Methodology

It was the intent of this study to contribute information regarding the effectiveness of teaching students with learning disabilities (LD) a comprehensive test-taking strategy system. Specifically, students' locus of control (LOC) orientation was investigated. A review of the purpose, literature, and methodology for the present study is presented in this section.

Review of Purpose

The present study was designed primarily to investigate the LOC orientation of students with LD prior to and after participation in a complex strategy intervention that focused

on a test-taking strategy system. The impact of the complex strategy training on LOC orientation was determined by analyzing the students' pretest and posttest scores on two measures of LOC. Expectancy of success, a behavioral indicator of the dependent variable, was included. Of secondary interest was the effectiveness of the strategy intervention on the students' test-taking skills. Also of interest was the students' and their teachers' evaluation of the strategy intervention.

Review of Literature

The development of metacognition and motivation for students with LD has become a recent goal in special education. The need to increase the motivation of students with LD has led researchers to study specific affective variables such as locus of control (LOC). Recent efforts to understand the links between an external LOC for reinforcement and poor performance on school-related tasks among students with LD have been reported.

Researchers have been encouraged to seek methods to alter an external LOC orientation because of the preponderance of desirable achievement behaviors associated with an internal LOC orientation. Based on a review of the research literature, it was concluded that student perception of an internal LOC and achievement are highly correlated and that student perception of LOC can be altered.

Research on the effectiveness of using educational interventions to change the LOC orientation of students with

LD is limited. Clearly, further investigation of the LOC orientation among students with LD was warranted. A complex cognitive strategy that has been shown to improve students' test-taking skills, as well as promote a sense of control over educational outcomes, was selected as an appropriate intervention for students with LD in the present study.

Review of Methodology

This study was designed to examine the effects of teaching a complex test-taking strategy on the locus of control orientation of middle school students with learning disabilities. The following null hypotheses were posited for testing at the .05 level of significance.

H1: There will be no statistically significant difference between the experimental group and the comparison group on a global measure of locus of control.

H2: There will be no statistically significant difference between the experimental group and the comparison group on a specific, academic measure of locus of control.

The participants in this study were 44 middle school students with learning disabilities, attending school in Ocala, Florida. The design of the study was a randomized pretest-posttest control group design. After initial screening with the strategy pretest, all students were randomly assigned to experimental (N = 22) and comparison (N = 22) conditions. After random assignment to groups, all students were pretested with the two measures of locus of control, the Nowicki-Strickland Locus of Control (NSLOC)

Scale (Nowicki & Strickland, 1973) and the Individual Achievement Responsibility (IAR) Scale (Crandall, Katovsky, & Crandall, 1965). Due to family relocations and absences, two experimental group students and two comparison group students did not complete the treatment sessions; their scores were not included in the data analyses, resulting in an N = 20 for the experimental group and an N = 20 for the comparison group.

Students in the experimental group were taught comprehensive test-taking strategies. Teaching procedures and student materials for the experimental group were included in the Test-Taking Strategy manual (Hughes, Schumaker, Deshler, & Mercer, 1988) which incorporates motivational theory and metacognitive principles. Students in the comparison group were taught general study skills (i.e., skimming and notetaking). Teaching procedures for the comparison group were developed by the principal investigator. Student materials for the comparison group consisted of social studies textbooks and workbooks typically used in the students' classrooms. The number and length of the sessions were the same throughout the study for both the experimental and comparison groups. Students in the experimental condition were taught by the principal investigator and two master's level graduates from the University of Florida, Department of Special Education. Students in the comparison condition also were taught by the two master's level graduates.

A criterion measure related to the dependent variable was assessed by asking students in both conditions to make predictions regarding scores on future tests. On three occasions, students in both conditions were administered identical practice tests taken from the Test-Taking Strategy. In the experimental condition, elaborate feedback that related the students' previous test performance to their use of the strategy was provided before students predicted scores on the next test. In contrast, no feedback other than the actual, obtained test score was provided in the comparison condition before students predicted scores on the next test.

After the participants in the experimental condition reached the 90% criterion established for mastery on the strategy posttest, all participants were posttested with both measures of the LOC variable. An analysis of variance with repeated measures was used to determine significant differences between the experimental and comparison groups on the dependent measures.

Summary and Analysis of Results and Related Findings

The purpose of this section is to summarize the hypotheses and present conclusions regarding the hypotheses. Next, related findings are summarized and discussed. Finally, the results of the social validation measures are summarized and discussed.

Summary of Hypotheses

The hypotheses dealt with the effects of a cognitive strategy on the locus on control orientation of middle school

students with learning disabilities. The null hypotheses stated that no differences would be established between the experimental and the comparison conditions. An analysis of the collected data resulted in a failure to reject the null hypotheses. A significant main effect was found within subjects. An analysis of these results indicates that students, regardless of whether they received the intervention, scored higher on the posttest than on the pretest on both measures of locus of control. Although there is no prevailing evidence of the Hawthorne effect in field-based research (Cook & Campbell, 1979), the significant main effect (within subjects) may be attributed to participants' awareness of being in a research study. Therefore, the Hawthorne effect is one possible explanation for the significant main effect (within subjects). Finally, no significant interaction between groups (treatment) by performance over time was found for either measure of locus of control.

Review of Related Findings

Correlation analysis on specific variables. An examination of the correlation coefficients for the experimental group yielded (a) a strong positive relationship between Verbal IQ scores and the Nowicki-Strickland Locus of Control (NSLOC) Scale (Nowicki & Strickland, 1973) posttest scores and (b) a moderate positive relationship between Full Scale IQ scores and the NSLOC Scale posttest scores. Students in the experimental condition with higher Verbal IQ

scores and those with higher Full Scale IQ scores tended to have higher NSLOC posttest scores (i.e., higher internal locus of control). No significant correlations were found between Verbal IQ scores or Full Scale IQ scores and the Individual Achievement Responsibility (IAR) Scale (Crandall, Katovsky, & Crandall, 1965) posttest scores. Moreover, correlation coefficients for the comparison group yielded no significant relationships between Verbal IQ scores or Full Scale IQ scores on either of the two measures of locus of control.

Analysis of obtained versus predicted scores. Student expectancies for success or failure were assessed by asking students to make predictions regarding scores on future tests. Students in both groups had taken identical practice tests on three separate occasions. Students in the experimental group were given their obtained test scores and elaborate feedback on their performance before they made predictions. Students in the comparison group were given only their obtained test scores before they made predictions. Scatterplots of the obtained and predicted scores for each group over three test occasions were visually examined. A strong, positive linear relationship was found between obtained and predicted scores for students in the experimental group over three successive test occasions. Moreover, mean predicted scores for the experimental group consistently increased over the three occasions. In contrast, the comparison group, on the average, predicted

scores close to their obtained scores over three successive occasions. Although the mean predicted scores for the comparison group consistently decreased over three successive occasions, no relationship between obtained and predicted scores was evident from a visual examination of the scatterplots.

Review of Social Validation Measures

At the conclusion of the study, participants in the experimental group (N = 20) and their special education teachers (N = 4) expressed their opinions about the importance, the effectiveness, and the practicality of the strategy intervention. Satisfaction questionnaires were completed by all students in the experimental group and their special education teachers. Overall, the ratings of the students in the experimental group and their special education teachers indicated satisfaction with the test-taking strategy system.

Theoretical Implications of the Research Findings

The present study was designed primarily to investigate the locus of control orientation of middle school students with learning disabilities (LD) prior to and after participation in a complex strategy intervention that focused on a test-taking strategy system. An analysis of the collected data resulted in a failure to reject the null hypotheses. Therefore, the results of the present study do not support the theoretical rationale that training in a complex cognitive strategy system (the Test-Taking Strategy)

which incorporates motivational theory and principles from metacognition can have a significant impact on the locus of control orientation of students with LD.

Since the results of the present study do not demonstrate effectiveness of training in a complex cognitive strategy to alter students' LOC toward a more internal orientation, the ability to derive implications is limited. One possible explanation for the findings of no significant differences is that it is possible that explicit and repeated generalization training, within the strategy system, is needed before changes in an individual's specific, academic locus of control and more global locus of control can be realized. In the present study, students in the experimental group were prompted throughout the complex strategy training to apply the strategy system in their classrooms during test situations. Some of the students reported periodically that they had used the strategy system on a history test or a science test; however, no explicit instructions were provided to the students regarding generalization other than discussion about different situations in which they could apply the strategy system.

Another possible explanation for these results is that the sample mean scores for the IAR locus of control measures indicates that the students in the present study obtained scores (20.90, SD = 4.64 for the Experimental Group and 23.20, SD = 3.54 for the Comparison Group) that were above the sample mean IAR total score (19.22, SD = 1.6) as reported

by Crandall, Katovsky, and Crandall (1965). Students in the present study obtained IAR Total scores that suggest an internal locus of control orientation prior to the strategy intervention.

The finding that higher Verbal IQ scores and higher Full Scale IQ scores correlated positively with higher NSLOC Scale posttest scores (i.e., internal locus of control) suggested that students with higher measured intelligence learned to attribute success or failure outcomes to their own behavior. The variance in performance on the NSLOC Scale with regard to higher measured intelligence for the experimental group is compatible with the view that some students with LD may learn to attribute outcomes to controllable factors after training in a complex cognitive strategy in which motivational and metacognitive principles are incorporated. The proposed explanation for the correlation between higher IQ scores and a more internal locus of control is that some students with LD, i.e., those students with higher Verbal IQ scores or higher Full Scale IQ scores, may have learned to recognize and appreciate the empowering effects of the complex cognitive strategy system and thus understand that outcomes are linked to controllable factors such as use of strategies, prior knowledge, and effort.

The finding of consumer satisfaction with the strategy intervention expressed by the special education teachers has implications with regard to the relatively new body of literature on teacher beliefs. Implicit in the widely held

assumption that teacher planning and decision-making are influenced by teacher beliefs is that teachers' tacit or unexpressed beliefs about the curriculum can and should be made more explicit through direct questioning, for example by a researcher (Clark & Peterson, 1986). The special education teachers who participated in the present study not only expressed overall satisfaction with the test-taking strategy system but also explicitly indicated their desire to teach the strategy system. Thus, it can be assumed (a) that the teachers' principles of practice were directly and positively influenced by the intervention in the present study and (b) that that act of making explicit their beliefs about the usefulness of the strategy may have had an impact on subsequent curriculum planning and decision-making for their students. It is interesting to note, as a follow-up to the present study, that the special education teachers who participated in the present study made a commitment to participate in inservice training to prepare them to teach the test-taking strategy system during the next school year.

Limitations to the Present Study

The students included in this investigation were all middle school students with specific learning disabilities. Due to the reading requirements for the comprehensive strategy training, students whose reading level was determined by their teachers to be below upper third grade level were not considered for inclusion in the present study.

Suggestions for Future Research

Three bodies of research on (a) locus of control, (b) metacognition, and (c) cognitive strategy intervention, have developed in relative isolation. There are good reasons to establish connections between research efforts in metacognition, locus of control, and strategy intervention systems that have been relatively isolated from one another. The review of the literature in all three areas emphasizes that cognition, metacognition, procedural skills, strategies, and motivational factors such as locus of control are important determinants of learning. Further research is needed to determine the educational interventions that can alter locus of control orientations of students with learning disabilities. Understanding how to alter the locus of control orientation of students with learning disabilities would have important implications for educators.

Additional research is needed to provide information about the relationships between measured IQ, propensity to use and generalize metacognitive strategies, and motivational beliefs of students with learning disabilities. Further attention also needs to be given to understanding the relationship between teacher planning and instruction and the subsequent effects on students. Finally, more research is needed to understand how teachers' beliefs about curriculum choices and their beliefs about their capacity to affect students' motivational levels and metacognitive awareness can be empowering for educators.

APPENDIX A
PARENT INFORMATION LETTER

PARENT INFORMATION LETTER

Dear Parents:

I am a doctoral student in the Department of Special Education at the University of Florida. As part of my dissertation research I am studying the motivational outcomes of learning strategy instruction. The purpose of my work is to determine whether students who learn how to improve their test-taking skills will feel more in control of educational outcomes. It is believed that students who participate in this study will become more motivated and interested in their educational programs.

Specifically, I am asking your permission to (1) include your child in this project and (2) obtain aptitude and achievement and other descriptive information from school records. Once the project begins, the students will be asked to participate in daily instruction sessions. These sessions will last for 30 to 40 minutes and take place over a 3 to 4-week period. These sessions will take place while the students are in either in the first or second period of the day and will not otherwise affect the students' schedule or grades. Two graduate students in special education who have been trained to teach the test-taking strategy will be training the students.

Participation in this project is in cooperation with Mr. Heckmeyer, the principal of North Marion Middle School, as well as Mr. Campbell, and Mrs. McCarthy-Jensen. All information will be held in strictest confidence. No names will be recorded and students will be referred to by number in all written reports. Children may be withdrawn, without penalty, from the study at any time.

If you have any questions about any aspect of this project, please call or write to: Victoria Morin, University of Florida, Department of Special Education, G 315 Norman Hall, Gainesville, FL 32611; Phone: 392-0701 or 473-6636.

Sincerely,

Victoria Morin
Principal Investigator

APPENDIX B
PARENT PERMISSION FORM

PARENT PERMISSION FORM

A.

I give permission (1) for my child _____ to participate as a volunteer in the study of developing test-taking skills and (2) for aptitude and achievement scores and descriptive information to be obtained from my child's school records for use in this study.

YES ___ NO ___

B.

I have read and fully understand the description of my child's participation in the project named above and have received a copy of this description. I understand that all information will remain strictly confidential with respect to the identity of my child. I understand that I may withdraw my consent for my child's participation in the above named project at any time I wish.

YES ___ NO ___

_____ _____

(Parent/Guardian) (Date)

_____ _____

(Parent/Guardian) (Date)

APPENDIX C
SUBJECT CONSENT FORM

SUBJECT CONSENT FORM

Student Name_____ Grade_____

Teacher_____ School_____

A. My teacher has explained to me that I have the opportunity to learn skills that will help me take tests. I would like to participate in this learning project. I understand that observers will be watching me during some of the instructional sessions so that the learning project can be evaluated. Also, I understand that my identity will be kept confidential, and a number will be used in all permanent records instead of my name.

YES ___ NO ___

_____ _____
(Student Signature) (Date)

_____ _____
(Classroom Teacher Signature) (Date)

_____ _____
(Principal Investigator Signature) (Date)
Victoria Morin

APPENDIX D
INSITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF FLORIDA
INSTITUTIONAL REVIEW BOARD
114 PSYCHOLOGY BUILDING
GAINESVILLE, FL 32611-2065
(904) - 392 - 0433

April 29, 1993

TO: Ms. Victoria Morin
G315 NRN

FROM: C. Michael Levy, Chair,
University of Florida Institutional
Review Board

SUBJECT: Approval of Project #93.191
The effects of a cognitive strategy on locus of control for students with learning disabilities

I am pleased to advise you that the University of Florida Institutional Review Board has recommended the approval of this project. The Board concluded that your subjects will not be placed at risk in this research, and it is essential that you obtain legally effective informed consent from each participant's parent or legal guardian. When it is feasible, you should obtain signatures from both parents.

If you wish to make any changes in this protocol, you must disclose your plans before you implement them so that the Board can assess their impact on your project. In addition, you must report to the Board any unexpected complications arising from the project which affect your subjects.

If you have not completed this project by April 29, 1994, please telephone our office (392-0433) and we will tell you how to obtain a renewal.

By a copy of this memorandum, your Chair is reminded of the importance of being fully informed about the status of all projects involving human subjects in your department, and for reviewing these projects as often as necessary to insure that each project is being conducted in the manner approved by this memorandum.

CML/her

cc: Vice President for Research
College Dean
P. Sindelar
Dr. Cecil Mercer

Unfunded

APPENDIX E
PROCEDURAL RELIABILITY FORM

TIME SAMPLING RECORDING FORM
FOR
PROCEDURAL COMPLIANCE

Observer _____ **Date** _____

Teacher _____ **Period 1** _____ **Period 2** _____

Instructions: **Every 30 seconds, at the sound of the beep, observe the teacher and place a check mark in the appropriate box(es).**

	30	60	30	60	30	60	30	60	30	60	30	60	30	60	30	60	30	60	30	60
1. Following Content																				
2. Following Sequence																				
3. Using Materials																				

Notes:
1. Following Content of the Test Taking Script (e.g., use of the words: PIRATES, PASS, RUN, ACE).
2. Following the Sequence of Test Taking Instructional Procedures (e.g., explaining or modeling steps of PIRATES).
3. Using the Test Taking Instructional Materials Appropriately (e.g., providing students with controlled practice tests included in the Test-Taking Strategy Manual).

APPENDIX F
STUDENT SATISFACTION QUESTIONNAIRE

STUDENT SATISFACTION QUESTIONNAIRE

Name_____ Date_____

Directions: Place a check beside the response that best describes your opinion. Write any additional comments that support your opinions in the space provided at the end of the questionnaire.

1. The PIRATES strategy helped me improve my test-taking skills.

   definitely did not ____ did a little ____ definitely did ____

2. My teachers have noticed that I improved my test-taking skills.

   definitely have not ___ have a little ___ definitely have ___

3. I improved my test-taking skills during at least one of my classes.

   definitely did not ____ did a little ____ definitely did ____

4. My family has noticed that I have improved my test-taking skills.

   definitely has not ____ has a little ____ definitely has ____

5. I could use the PIRATES strategy on my own to improve my grades.

   definitely could not __ could a little __ definitely could __

6. I would recommend that other students learn the PIRATES strategy to help them improve their test-taking skills.

   definitely would not __ maybe ___ definitely would __

Comments:_____

_____

_____

_____

_____

_____

APPENDIX G
TEACHER SATISFACTION QUESTIONNAIRE

TEACHER SATISFACTION QUESTIONNAIRE

Name_____ Date_____

Directions: Place refer to the attached list of students who participated in the PIRATES strategy training while you read the following questions. Place a check beside the response that best describes your opinion.

1. Students' test-taking skills are important factors in the grades they obtain on classroom tests.

   definitely are not ____ are a little ____ definitely are ____

2. I have noticed an improvement in my students' test-taking skills in at least one class.

   definitely have not ___ have a little ___ definitely have ___

3. The PIRATES strategy was helpful in improving the students' test-taking skills.

   definitely was not ____ was a little ____ definitely was ____

4. I would recommend that other students learn the PIRATES strategy to improve their test-taking skills.

   definitely would not __ maybe ___ definitely would __

5. I would like to teach the PIRATES strategy to my students to improve their test-taking skills.

   definitely would not __ maybe ___ definitely would __

Comments:_____

_____

_____

_____

_____

_____

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BIOGRAPHICAL SKETCH

Victoria Morin was born in New York City on January 24, 1951. The oldest of three children, Victoria graduated from The Mary Louis Academy, Jamaica, New York, in 1968. Victoria received a B.A. degree in elementary education from Queens College in 1972 and a Master of Education degree in special education from Idaho State University in 1982.

During the period 1980 through 1989, Victoria taught in Wyoming, Idaho, and Vermont. Her teaching experience includes teaching students with mild to moderate learning, emotional, and intellectual disabilities in grades K through 12, gifted students in grades K through 8, and regular fourth grade students.

While completing her doctoral studies at the University of Florida, Victoria has served as a graduate teaching assistant, as well as a graduate research assistant in the Department of Special Education, College of Education. During this time, she also served as a Liaison/Consultant and later as an Educational Diagnostician for the Multidisciplinary Diagnostic Training Program in the Ross-Mercer Project in the College of Education.

In addition to her training at the University of Florida, Victoria also received training in the Strategies Intervention Model in 1990 at the University of Kansas under

the direction of Dr. Deshler and his colleagues: Dr. Clark, Dr. Lenz, and Dr. Schumaker.

In addition, while pursuing this degree, Victoria has served as Vice-President of the North Central Florida Association for Gifted (1990-91) as well as President of the Special Education Association of Graduate Students in the Department of Special Education (1990-91).

Presently, Victoria is a member of Phi Delta Kappa, the Council for Exceptional Children (CEC), the Association for the Education of Gifted Underachieving Students (AEGUS), and the Learning Disabilities Association (LDA) of America. In the future, Victoria plans to continue her research on the motivational outcomes of learning strategy instruction as an Assistant Professor at Troy State University at Dothan, Alabama.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Cecil D. Mercer, Chair
Professor of Special Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Mary K. Dykes
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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